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STEAM WATER ELEVATOR.

The accompanying illustration represents a machine recently introduced and quite extensively used for supplying locomotives with water by direct steam pressure. It is also adaptable, as may be readily seen, to mining purposes, public water-works, paper mills and wherever large quantities of water are to be raised to any height. Between Galva and New Boston, on a branch of the Chicago, Burlington & Quincy Railroad, the machines have been thoroughly tested during the past year and have proved very satisfactory, both in economy and reliability in all kinds of weather.

The tank is placed in a well, secure from frost and not exceeding 25 feet from the surface of the water at its lowest stage, as it is filled by atmospheric pressure through an induction pipe. Steam is introduced from the locomotive boiler through the hose connecting with a steam-pipe which enters the top of the tank near its centre. The steam forces the water from the tank through the discharge-pipe connecting with the pen-stock and from this it is received into the tender. The valve-chamber for this pipe is shown just above the tank-head. The pipe extends to the bottom of the tank where it receives the water during a discharge, the inside extension being wood. While the discharge is being made, water is also forced through a small pipe from the bottom and passes up at the left hand and enters an air-chamber (shown upon the head of the tank), reaching nearly to its bottom. This pipe also connects with the steam-pipe, near which is a check-valve opening toward the latter. There is also a check-valve at the left of its connection with the air-chamber, opening toward the right as before. When steam is shut off at the boiler the compressed air drives water back from the air-chamber (closing left hand and opening right hand check-valve) and through the steam-pipe into the tank, where it falls in spray condensing the steam that filled it. The vacuum thus produced immediately refills it from the well.

This apparatus is cheap in construction, as it also must be in operation, having no wearing parts and requiring no attendants. The engineer and fireman can operate it, simply attaching and detaching the hose and swinging the pen-stock, filling the tender directly from the well and in a very short time.

When applied to ordinary pumping purposes it is constructed with a double tank, working alternately so as to throw a continuous stream of water, or, where the space is limited and only an intermittent discharge is required, but one tank may be used, as for locomotives.

Information concerning the invention may be obtained of Stevens, Denton & Company, at Galesburg, Illinois.

—The citizens of Jefferson, Texas, recently held a meeting to consider the means to be adopted to improve navigation between that city and Shreveport. It was resolved that the city of Jefferson issue her bonds to the amount of $20,000, at present to be appropriated to the said improvement, and that as soon as the charter of the city is changed by the Legislature, so as to enable them to do so, that bonds to the further sum of $10,000 or more be issued, to be applied to the payment of such improvement. Also, that Col. W. M. Harrison and John C. Murphy be appointed a committee to call on the merchants and business men of New Orleans and St. Louis, and obtain the aid they can toward the accomplishment of the improvement of the navigation of the lake and river.

Contributions.

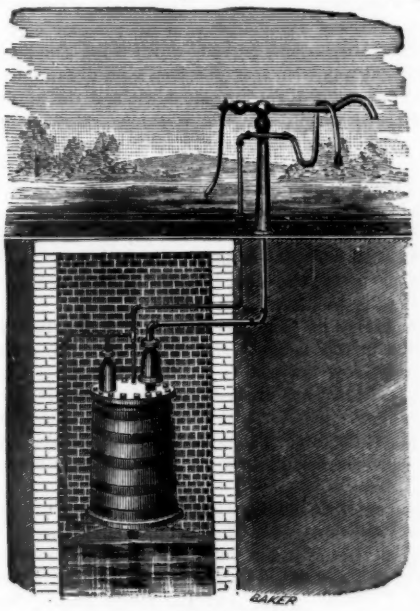
ENGINEERING.

Bridges and Their Foundations—Caissons—Pneumatic Cylinders—Recent Caisson Bridges—Substructures—Arch, Truss and Suspension Bridges—Railway Track—Gauges.

BY BENJ. H. LATROBE, C. E.

THIRD SECTION—SECOND LECTURE.

I need scarcely say that *rock* is of all foundations the best; and yet most of the great bridges of modern times are not based upon it, but upon artificial works constructed to take its place because of the impracticability of reaching it. The most extensive and important bridges are those crossing *navigable* rivers, the beds of which, when far below the flow of the tides, are usually composed of soft alluvium or mud, and higher up of harder and stiffer material, such as coarse sand and gravel, deposited more or less thickly upon the rocky substratum. The Thames at London may be classed with the first, and the Seine at Paris with the second; and in our own country the first is still better represented by the Hudson at New York, the Delaware at Philadelphia, and our Patapsco river, here; and the second by the Ohio at Wheeling, Parkersburg or Cincinnati.



Locomotive Tank Filler.

The bridges over the Thames at London, which are twelve in number, five of stone and seven of iron, are all founded upon the alluvial bed of the river, consisting of soft mud, marine shells, fine sand and clay in layers, and extending to an indefinite depth. The twenty-six bridges across the Seine at Paris are also founded upon an alluvial deposit somewhat coarser and more compact, as the river there is nearly 200 feet above the sea and upwards of 100 miles from the head of tide, while the tide of the Thames flows some twenty miles higher up than London. Upon both these rivers the piers and abutments of the bridges rest upon platforms of heavy timber supported (with few exceptions) by piles driven into the bed of the stream, the bottom of which is first excavated by dredging machines to a greater or less depth, according to its character for hardness or compactness and consequent ability to resist the scouring effects of the current. The piles when driven are cut off upon the same level near the bottom of the excavation, and the platform upon which the masonry is to be built is sunk so as to rest upon their heads. This may be effected in more than one way. The space may be surrounded by what is called a *coffer dam*, consisting of piles and plank driven into the bed of the river in two separate parallel lines, one within the other, and the space between them filled with clay well compacted, thus enclosing the spot with a water-tight body of material excluding the current and permitting the necessary operations within to be carried on as if upon land. Or, if the method just described should involve too much expense and delay, or other circumstances be unfavorable for its application, the timber platform upon which the masonry is to rest may be furnished with sides of the necessary height to shut out the water, and so converted into a box open at the top, technically called a "caisson" which is built upon the shore, floated to the place of the pier, and sunk gradually upon the heads of the piles by the laying of the successive courses of stone within it. In this case the piles must be cut off *under water*, and that is effected, at any desired depth and with perfect precision, by means of a circular saw at the lower end of a vertical shaft supported upon a large flat boat on which is the machinery by which the shaft and its saw is made to revolve with great velocity and to sever the pile with surprising quickness. The caisson is guided in its descent by a frame-work consisting of many piles driven around the site, properly connected by timbers at top and floored over above water so as to form a wharf upon which the workmen carry on the lifting and handling of the stone by suitable machinery and the laying of them in the pier. By these modes of operation the bridges upon the Thames and the Seine and most of the other rivers of Europe and America have been founded, where the depth of water was not extraordinarily great and the bed of the stream of sufficient consistence to sustain the weight of the structure when compacted by the piles driven into it, assisted by their own supporting power, acting as posts or pillars do in an edifice upon land.

A still different method of bringing the masonry of a pier to bear upon the piles so prepared to receive it has been successfully practised in several cases, by suspending a simple platform without sides, and hence not excluding the water, by means of large screws from the surrounding wharf, and lowering it gradually as each course of stone was added, being built above the water level. In this manner the Pennsylvania Railroad bridge across the Schuylkill at Philadelphia had its piers built, and some others that could be named.

The bridge across the Susquehanna at Havre de Grace had one of its caissons lowered in part by screws, and in water 40 feet deep. The sides of the caissons used at this bridge were of boiler plate iron instead of wood, the platform alone being of timber. The bed of this river, so familiar to most of us, is of bare rock for the western half of its width, while the eastern consists of sandy mud, into which piles have been driven to form the foundations of the pier on that side. The piers that came upon the rocky part of the bottom were built in iron caissons, like the others, but the timber platforms, instead of resting on piles, were supported by heavy stone work laid by divers clad in marine armor upon the bottom within an open box of boiler plate sunk under the pier and grouted with water-lime so as to form a compact mass of masonry enclosed in iron and surrounded by rip-rap. The services of divers were used in all parts of this important work and now make, in all subaqueous structures, one of the most useful resources of the engineer—having in great measure taken the place of the diving bell.

Although piles have been used in a large majority of the cases above referred to, it has sometimes happened that the bed of the river has consisted of gravel sufficiently compact to permit the platform to be laid directly upon it. In this event the undermining action of the water has been prevented by throwing around the base of the pier stone of irregular size and shape, technically called "rip-rap," and this kind of protection is also applied to *piled* foundations. Thick plank, called "sheet-piling," are also frequently driven close together around such foundations to guard against the scouring effect of currents, of which we have had such recent and remarkable illustrations in the floods of our neighboring rivers.

The power of water in rapid current to carry with it the material composing its bed is indeed astonishing, and

if time permitted, I could state many interesting facts in relation to it. A mode of establishing foundations practised by the French engineers in some localities is to surround the space to be occupied by the pier with a single row of piles and sheet piling, and after leveling the bottom by dredging down to the desired depth, to fill the interior area with *concrete* consisting of gravel, pebbles and broken stone intermixed with sand and water lime, which, setting into a solid mass by the cementing action of the mortar, furnishes a substantial base in which to build the masonry of the pier. This method cannot of course be applied to very yielding or compressible soils.

Where the bed of the river is of rock (either already bare or easily laid bare), and the water is very shallow and clear, the lower courses of stone may be laid in the water without attempting to exclude it; but if the depth exceeds four or five feet, and the stream is turbid, one or other of the modes already described must be resorted to, omitting of course the platform and the piles.

The plans of which an account has now been given are those which, with certain more recent improvements, have been practised for a long time in both hemispheres. I must now briefly notice some methods of more recent employment in connection with the bolder designs which have become the order of the day. I have remarked that the tendency of bridge architecture has, for the past century, been towards wider spans and fewer piers, whereby more ample water way and diminished difficulty in foundations would be secured. It must however be observed, that although in the older bridges the more numerous piers and narrower arches multiplied the *under-water* works, and subjected them to more danger from the scouring action of the stream, they also increased the number of the points of support, and reduced the weight borne by each of them, so that less care was required to make them individually solid than if they had been fewer in number. This consideration will account for the extraordinary precautions now taken to secure an unyielding base for the few and far between supports of the gigantic superstructures of the present day. Wherever rock or something nearly equivalent to it is to be found within depths before unattempted, it is sought for as necessary to sustain the enormous weights now imposed by railway bridges of the spans now ordinarily resorted to in crossing wide and deep water. To meet these requirements, the engineers of Europe and America have called their highest inventive faculties into exercise, and the result has been some most admirable applications of natural forces to the accomplishment of their plans. The atmosphere which surrounds us has been the principal power invoked, and it has been literally *pressed* into service in sinking the foundations of bridges, just as it has been in drilling rocks, as I had occasion to show under the head of "Tunnelling." I refer to the *pneumatic* process, first used in France to reach a deep-lying vein and subsequently in England to reach a safe foundation for a bridge. Two modes of using the pressure of the atmosphere (which uncompressed is about a ton upon every square foot) can be employed. Imagine a hollow cylinder of iron, open below and closed at top, placed perpendicularly upon the alluvial bed of a river. If the air within the cylinder is drawn out of it by an air pump, the water and the sand, gravel or clay composing the bottom of the stream will be forced up into the empty space, while the cylinder will descend as far as the resistance it encounters will permit. This is called the *vacuum process*, and was the first applied, but it has since been superceded by the *plenum*, which is its reverse and consists in *forcing air into*, instead of *exhausting it out of*, the cylinder. By thus compressing the atmosphere in the interior of the iron column, the water and soft material of the river bed are driven out at the bottom, and their place supplied by condensed air, in which workmen can operate to remove the soil upon which the cylinder rests, and so enable it to go down until it reaches and rests upon the desired substratum, whether a rock or something which will be substantially as good. The cylinder, when so settled on its foundation, is filled with masonry or concrete, and becomes a solid pillar, capable of sustaining a great weight. The details of the machinery by which the process is made effective could not now be satisfactory explained in the brief time remaining to me, and I must hope that the somewhat vague idea I may have succeeded in communicating will enable you to see, at all events, that there is something clever in the contrivance, however mysterious its actual operation may be to those of my auditors to whom it is entirely new, You will readily perceive that by multiplying the cylinders to any desired extent, as many points of support upon the stratum to be reached can be obtained, and that in this way very large surfaces can be covered and structures of great magnitude reared upon the base so established. I will mention a few of the great bridges actually founded in this manner.

In England, the new bridge at Rochester, with two piers and as many abutments, is founded upon seventy cylinders of seven feet diameter each. The pier of Chepstow Bridge rests upon ten columns, six feet and upwards in diameter, of which six are carried up to the seat of the superstructure. The Macon Bridge over the Saone, in France, has its piers composed of three columns, each ten feet in diameter. The piers of the bridge over the Theiss, in Hungary, consist of two columns, each of ten feet diameter, sunk to a depth of thirty-nine feet below low water, twenty-nine feet of which is through the soil of the river bottom. The new railway bridge over the Garonne at Bordeaux in France is supported upon cylinders nearly twelve feet in diameter and sunk to a depth of fifty-two feet below low water. The great bridge over the river Tamar, at Saltash in England, has but one pier supporting, with the abutments, two spans of 455 feet each. The pier is built of masonry within a cylinder of boiler plate iron thirty-five feet in diameter and eighty-eight feet in height, the rock on which it is founded being eighty-two feet below high tide and covered with seventeen feet of soft mud. The daring genius of the engineer (the younger Brunel) who planned the Great Eastern steamship is farther illustrated in this stupendous structure, the construction of which was attended with extraordinary difficulties. There are seven railway bridges in Russia, built within the last ten years, over the principal rivers of that country, and supported by cylinders 6½ to 14¾ feet in diameter and filled with concrete, while at Warsaw the river Vistula is covered by a bridge the piers of which consist of four columns, two of which are eighteen and the remaining two nine feet in diameter, all sunk to a depth of forty-nine feet below low water and filled with masonry and concrete. At Orival in France, a bridge on columns of 11¾ feet in diameter was completed in 1864. This is the latest structure of the kind of which we have accounts.

Yet another mode of founding bridges at great depths has been practiced of late years, a brief notice of which must conclude what is said under the head of foundations. This consists of a combination of the pneumatic process with the caisson—the latter however being employed in a different way from that described some distance back—being *inverted* or turned upside down, and the air being compressed within it. The workmen standing under and within the inverted caisson are thus enabled to excavate the material of the river bed, which is hoisted out through an open cylinder reaching above water. As the excavation proceeds, the caisson descends with the masonry laid course by course upon its upturned bottom, and when the foundation is at length reached, the space within the caisson is filled with concrete, and the work is completed.

The bridge at Kehl over the Rhine has been constructed in this manner, the foundations being sixty-five feet below low water; and the bridge at La Voulte, over the Rhine, was erected upon a similar plan. At Busswill over the Aar, and over the Scorff at L'Orient, in France, the same general design was pursued, and with equal success, in bridges built not long since at those places.

This mode of founding piers has not as yet been so extensively employed in England or America as on the European continent, but there are already two bridges built in this way in the United States, over the Hudson River in New York, and the Great Pedee, South Carolina, and another in progress across the Cape Fear River near Wilmington, North Carolina. The foundations of the Great Suspension Bridge about to be erected over the East River, between New York and Brooklyn, also will probably be established on this system.

It seems from experience at the Saltash Bridge in England that, on account of its effect upon the workmen, compressed air cannot be used for foundations deeper than those of that structure, which are eighty-two feet below water, and also that for depths less than about thirty-three feet the older methods are the most economical and should therefore be adhered to. There is a useful though unpretending class of bridges called "pile bridges," of which there are specimens on the railway hence to Philadelphia and on many other arms of the Chesapeake Bay, as well as across the tidal rivers and creeks of the Delaware and other estuaries of our coast. These are commonly constructed wholly of timber, but their pile supports may be of round bars of iron with screw-plates of large diameter at the bottom, which, when forced down into the muddy bottom by giving the shaft of the column a rotary motion, afford a broad unyielding base to sustain a heavy superstructure. The numerous lines of railway which England has established in her East India possessions cross many rivers to which this form of bridge is applicable, and there are many of them of great length and excellent construction in iron. The rows of piles are placed at various distances apart, as the character of the stream may require, and the piers composed of them are connected by trussed superstructures of spans usually about sixty feet long. Many of the light-houses on the sandy sea shoals of Europe and America are founded in this manner, the iron piles being continued high enough above water to put the building containing the light out of reach of the waves, which dash harmlessly against the slender shafts which support it.

Superstructures.—Leaving now the subject of bridge foundations, I will offer such remarks upon that of their superstructures as time will permit; and to render much verbal description unnecessary I have prepared the sheet of diagrams on which you will see the principal forms which they have assumed up to this time under the three heads of arched, truss, and suspension bridges. To exhibit the change, already adverted to, between the openings and the piers which separate them, that has been gradually growing for a century or more, I have on that part of the sheet appropriated to arches shown the one of the stone bridges over the Thames at London, called "London Bridge," in its original form of the twelfth century, and also in its *new* form as rebuilt in the present century upon the site of its venerable predecessor, removed to give place to it. The contrast cannot fail to strike you. There were two other old stone bridges, that of Westminster, finished in 1750, and Blackfriars in 1771—both of them since removed and the former replaced by a beautiful structure of iron, while the latter is now being rebuilt. Southwark bridge, with its three bold spans of 240 and 210 feet of cast iron is next seen, and I have also shown an iron arch proposed by Telford to replace old London Bridge with a single span of 600 feet. It was not from distrust of the ability of that illustrious engineer to execute his magnificent idea, but from other considerations, that his plan was not carried out, and I have therefore added it as an interesting example of the progress of science and skill in the profession. The scale of this part of the drawing is uniformly twelve feet to an inch, so that the relative size of all the bridges is correctly shown and they can be compared at a glance. I have selected for this purpose the London bridges, not so much because they are superior to those of Paris and other cities of Europe, as because they answer my purpose better to explain the progression I desire to show.

Trusses.—Below upon the same sheet I have exhibited on the same scale of twelve feet to an inch the principal forms of truss bridges of the larger spans, as they have been executed or projected in different works in Europe and America. Each of these forms has its recommendations and also its favorites among engineers; for although engineering is properly classed among what are called "the exact sciences," there is still some room left for the exercise of judgment, and taste, too, in these various combinations of parts, although the same general principles run through them all, and a preference for one or the other must be founded upon its economical and judicious application to the particular case in hand. All of the forms here shown have been or can be executed in iron, which is the material exclusively employed in them in Europe and is rapidly becoming so in America. Cast iron has heretofore been used in certain parts of them, but it is giving place more and more to the exclusive employment of wrought iron, as safer and on the whole no more expensive.

Suspension Bridges.—In order to permit a comparison between the lengths of span to which arch and truss bridges have been thus far carried, and they have probably reached their economical if not their safe limit, I have added a third sheet, showing a sketch upon the same scale with the others of the two largest suspension bridges which have been executed to this time, together with the one to be built across the East river between New York and Brooklyn, the construction of which is about to be actually commenced. This last colossal work will necessarily eclipse its predecessors, but it must be remembered that *they*, when undertaken, were still more than this in advance of those which had preceded them, and that it is always step by step that we pass from one new enterprise to another, each forward move requiring perhaps an equal exercise of courage and of faith. The distinctive characteristics of the three classes of superstructures here exhibited may be briefly stated to be these:—

1. That the material composing the *arch* is altogether in a state of *compression*; that is, the effort of its own weight and that of whatever load it is carrying is to *crush* it, and if the abutments upon which it rests and against which it *pushes* do not give back, this is the manner in which it would be destroyed. If its abutments yielded it would in falling come into the condition of the truss, and be partly crushed and partly torn asunder.

2. The metal in the *truss* is partly in a state of *compression* and partly in one of *tension*: the upper part is in the former and the lower in the latter condition, and an

exact balance between them must be maintained or the system will be broken up (partly by crushing and partly by tearing apart as just described); but this counterpoise of forces taking place *within the truss itself*, it exerts no *thrust* against the abutments or pieces but simply rests upon them with its own weight and that of its load, as if it were a solid beam.

3. The cables or chains of a *suspension* bridge are entirely in a state of *tension*, or the direct reverse of that of the arch, and the tendency of the strain to which they are subjected is to *pull* the abutments instead of *pushing* them over. When a suspension bridge falls, then, it is either by the *parting* of the cables or chains, or by the overthrowing of the towers on which they rest.

According then as the locality of a bridge and the duty it is to perform is best suited to a compliance with the conditions upon which the stability of one or the other of the three classes of structures depends will it be expedient to employ one in preference to the other. It must be remarked also that the safe limit of space, both in the arch and the truss, is much lower than in the suspension bridge, so that after passing the point beyond which it would be hazardous to employ either of the two first, a resort to the last is indispensible; this being the case, it is fortunately a property of the suspension bridge that the longer its span, up to the limit of safety, the better fitted it is to bear steadily its burthen, whether of a crowd of people or a railroad train. This may seem paradoxical, but it depends upon the simple principle that the weight of the bridge itself, as its span elongates, increases more and more *relatively to that of its load*, and hence that *flexibility*, which is the characteristic feature of a bridge of this class under a moving mass either of men or of machinery, is less and less a source of disturb ance to it. We may illustrate this by reference to the feats of a performer upon the slack rope, which most of us have witnessed at some period of our lives. The acrobat walks safely upon a slender strand which he could carry in his pocket, but at every step he sinks while the the rope rises before and behind him. Replace the cord then by a cable as heavy as his own body, and you will see the difference, and if the weight of the cable is increased to a certain degree he will scarcely wave it as he treads. So it is with the suspension bridge:—unfitted to carry a railway train until it passes a span of some 500 or 600 feet, and beyond that limit the only form of superstructure capable of the duty.

In bringing this part of my subject to a close I must notice the wonderful rapidity with which bridge construction is advancing in the United States. But eighteen or nineteen years ago the enterprising city of Wheeling threw a suspension bridge of 1,000 feet span across the Ohio river, and the city of Pittsburgh did her best to cause it to be taken down on the ground of an interference with the navigation; and but for the interposition of Congress, which saved the bridge by declaring it a post road, it would have been removed in order to allow steamboats to make their chimneys a little higher. This conflict between the "river men" and the "railroad men," as they are termed, as representative of the great land and water system of transportation, is not yet ended. Nevertheless the National Legislature has wisely, in its regulation of commerce between the States, granted the right to bridge all the navigable waters of the country, under certain restrictions as to length of span and head and channel room for vessels. Already the Ohio at Steubenville is crossed by the Pennsylvania railroad on a firm bridge of stone and iron, and two more at Bellaire and Parkersburg are being erected on the same general plan, with openings of 350 feet where the channel occurs, and spans of 200 between it and the shores, and a clear height in the channel span of ninety feet above low water. At Louisville a high bridge of a mile in length, across the Falls of Ohio, is in progress (since completed) with two channel spans of 370 and 400 feet and the remaining openings of less width. A bridge for railway purposes is also about to be erected at Cincinnati, not far from the magnificent suspension bridge of 1,060 feet span. None of the Ohio river bridges will be built with *draws*; but upon the Mississippi, where the width of the valley makes a high bridge for boats to pass under at all stages of the water as excessively costly work, the acts of Congress have allowed draws or moveable openings for the passage of steam vessels. At Rock Island a bridge of this kind was built some years ago, and another at Clinton has been erected for some time. Within the last two or three months two more bridges have been opened over the Mississippi, at Dubuque and Burlington. The rapidity which these extensive structures have been constructed is really amazing. The one at Dubuque, of 1,760 feet, or one-third of a mile, in length, was begun only in February of last year, and opened for railway trains in December, thus requiring but ten months for its entire construction. It is an exceedingly fine structure, the piers of the best masonry founded on piles by the aid of "caissons," and the superstructure wrought iron trusses of 225 and 250 feet spans, the draw having two equal openings of 160 feet each.

The Burlington bridge is 2,237 feet in length, and necessarily required a longer time for its erection, but has been built with a rapidity quite surprising when its great extent is considered. Its masonry is of like character with that of the bridge at Dubuque, and its superstructure also of iron, with a draw of similar openings. The bridge at Quincy, across the Mississippi, is another structure of the same general character. It is of greater length than either of the others, and was erected in a remarkably short time, considering the substantial manner in which every part of it is built. An arched bridge of steel has been designed and its erection commenced at St. Louis, which will rival the finest structures of Europe. It will consist of three arches of 500 feet span each, with height sufficient at the crown to pass steamboats at high water, therefore not needing a draw. A bridge is being also built over the Missouri at Kansas City, and another at St. Charles, across the same river, which will be sufficiently elevated to permit the passage of boats at all times. The Missouri is the most difficult river in the West to bridge, on account of its shifting channel and bed of the finest and lightest sand; but it will be crossed by the locomotive and its train within the ensuing year or two, not only at the points just mentioned, but one or two more, as at Omaha, the eastern terminus of the Union Pacific Railroad.

Within the last few years a class of structures has come into request which is not embraced under any of the preceding heads. Where wide, deep valleys, with inconsiderable streams of water, are to be crossed at high levels, the construction—formerly always of a temporary and perishable character—called *trestle work* is well adapted to the purpose, and has been adopted as a permanent feature upon several important lines. The first one, I believe, erected in this country, some seventeen years ago, of iron, is across a deep chasm on the Cheat river grade of the Baltimore & Ohio Railroad, and has been much admired by travelers upon that line. Within the last year several of much greater extent and of very light yet substantial construction have been put up on the Louisville & Cincinnati Railroad of Kentucky and the Nashville & Chattanooga Railroad of Tennessee.

I must now have done with this branch of my discourse, and indeed I find myself at the termination of my allotted time without having touched upon several topics of much interest in the railway system, of which I had intended to treat. Not having been able, however, to reach them without injustice to those with which I have occupied your attention thus far, I must ask your indulgence for a few minutes more while I briefly refer to some of them.

The works now described embrace what is required to form the *bed of the road*, upon which what is called the *track* is laid, and they constitute by far the greater part of the entire structure of the railway. The track itself is a very simple and easily built thing—consisting only of a bed of broken stone or gravel technically called *ballast*, on which wooden sleepers or cross-ties are laid, and surmounted by the two lines of iron rails. There have, indeed, been very many forms of track proposed and practiced by different engineers, many of them very ingenious and having good points, but the almost universal plan is now that just described, making due allowances for differences in depth and width of ballast, size of sleepers, weight of rail, and form of connection of the bars where they meet. The wear of the rails under the steadily increasing weight and number of locomotives and trains has increased to so serious an extent as to lead to the use of steel instead of iron, either by making the rails altogether of steel or by applying it in various ways to the wearing surface, and upon roads of heavy traffic the rails will hereafter be so made or treated as fast as the improvement can be effected.

The *gauge* of the track, or the clear distance between the rails, has been the subject of much discussion in England and with us; and so warm was the contest in the former country some twenty years ago that it was known as the battle, not the Homeric one of the frogs and mice, but of the "gauges." In England there are but two gauges, one of them 4 feet 8½ inches, called the narrow, and the other 7 feet, the broad gauge. The latter originated with Brunel, who, impelled by his genius rather than guided by his judgment, planned his track in the same spirit of innovation that he designed his steamship and his bridges. In the United States there are no less than six different gauges, ranging between 4 feet 8½ inches and six feet; and the consequences to the internal trade of the country are, as you may suppose, far from favorable.

I would say much more about tracks, but I must leave them, and passing over "water tanks," "engine houses," "machine shops," "station buildings," and "telegraph lines," which make up the remainder of the *fixed* part of the railway institution, and about all of which I might make remarks to the purpose, I will conclude with some brief references to locomotive engines.

This subject of *locomotive engines* is indeed a rich one, well worthy of a long discourse, which could be made in no ordinary degree entertaining by one well stored with the recollections of its early introduction and a thorough knowledge of its history down to the present time. There may be some sitting here who remember the collection of odd-looking machines which the competition among our machinists excited by the invitation of the Baltimore & Ohio Railroad Company collected for trial on that road in 1830, and they may not have forgotten the little English locomotive significantly called the "Herald," placed upon the Baltimore & Susquehanna Railroad in the same year, in which coke, made at great expense from Richmond or English coal, was first used, simply because it was used thus for a different reason in England, until it was discovered that our pine wood was a still better fuel, except that in the absence of a "spark arrester"—not then invented—it sometimes set the fences and haystacks on fire. There was quite a difference of opinion at that time as to which of the two companies pursued the wisest course; whether the one which, without much reference to what had been previously done in England, aimed to procure at once an engine of domestic design and manufacture and adapted to the peculiar character of its road, or the one which sought to save time by starting at the point to which English skill and experience had carried this new motive power and endeavoring to adapt the strange creature to its new sphere of action. It is not necessary to settle that question now, for whatever may have been the original difference in their engines, they are now using essentially the same model, which the skill and experience of forty years has produced and which leaves scant room for further improvement.

But I find opening upon me so large a field for discourse on this fruitful theme that I must pause before entering upon it lest I should lose myself in it, as well as the favor of my audience, through which I have been so kindly listened to thus far, and which, if not taxed too heavily now, may allow me on some future occasion to tell the remainder of my story. The excavations and embankments, the tunnels and bridges and track, with the appurtenances of water tanks and engine houses and work shops and station buildings, are but the theatre of action of the locomotive engine—only the *body* of which *it* is the *soul* and the *spirit*. In all that I have said, therefore, I feel that I have only been laying a foundation for an edifice which I may or may not be permitted to rear hereafter. However that may be, I shall not the less gratefully remember the friendly attention with which you have heard me to-night with my thanks for it I bid you farewell.

ON PERMANENT WAY.

Lying as this does, at the very foundation of the railway system, has it received as much attention as it merits? Has the railway track attained perfection with the wooden tie and solid rail, secured together by the rudest of mechanical appliances? Do railway managers hold out encouragement and inducement enough to inventors in this line? Are the theories of railway engineers correct in their views as to the bearings and wear of machinery on rail? These are pregnant questions, which it is hoped will open up a line of discussion among your readers and correspondents such as cannot but prove instructive and interesting.

For myself, I take take the negative of most of these propositions. Permanent way, no more than the rest of the system, has yet attained perfection. The steel rail is a long stride over the common iron one, yet it is comparatively a recent introduction, permitted with many scoffs and doubts, which are not yet dispelled in the minds of conservative railway men. Other improvements in shape, connections, attachment of rail to the ties, iron instead of wooden ties, etc., are certainly not far distan in the future, however reluctant we may all be to accept them, either now or when they actually arrive.

I do not hesitate to announce my dislike to the changes made of late years in the shape of the rail. It is getting to be much too high—too much like a knife-blade—it has too much leverage on the tie and is too liable to draw the spikes, and it lets the train fall too far when this occurs, scattering destruction everywhere, and especially on curves. I prefer a shape for a rail that does not hold all the iron under the train. I prefer a rail that will be almost, if not quite, as smooth in one place as in another; that will not make low joints, or puddles, under the ties; that will so distribute the pressure all over the track as to make all the bearings as nearly alike as possible, everywhere; that will obviate, as far as human foresight and invention can do, the present casualties from broken rail s

or those that have broken loose from the ties. Can these advantages be attained without paying too much for them in the way of complicated and expensive contrivances? It is my opinion that they may be.

It is the impression of the writer, that when a perfectly smooth railway track has once been attained that can be kept so without too much vigilance and effort, a much lighter rail may be used than is now generally found on first-class roads. It is not the use of a rail which breaks it; it is the abuse—the allowing beaten up, broomed iron to remain too long on the track, causing so much bumping or jumping of heavy freight cars and still heavier engines, which act with two-fold destructive power, destroying both track and car trucks. Once given a track that is always a perfect plane, such as railways are theoretically presumed to be, and the weight of iron in a rail is a matter of secondary importance. Dangerous as such an opinion may seem to be, all engineers have not yet abandoned the rail made in two pieces, so often condemned as "compound," as offering the greatest capacity for improvement in the desired direction. The old split or halved rail, which was so largely tried in the West, certainly had many advantages in this respect. The misfortune was, its lack of permanence. It had neither base nor head, for it was split vertically. It was impossible for the bolts through it to keep it upright, and with the least slant, the full weight of the trains fell first on one-half, which, when crushed, was instantly followed by the breaking down of the other half also. Added to this, the vertical fissure admitted water, which in winter froze there, and its expansion into ice forced apart the two halves with irresistible force, stripping the nuts from the bolts, and completing the destruction. It was strange that this was not foreseen by engineers before it was so extensively adopted. But this was not so strange as the unreasonable prejudice afterwards and since sustained by so many railway men against any sort of a so-called compound rail, or a rail made of more than one piece of iron.

My idea of a perfect rail is one embodying the principles before laid down in this paper, consisting of a rail that will retain, practically, the perfect plane which all railways are supposed to be, and certainly ought to be. One which will preserve this without too much attention and labor, and which will dispense with gravel or stone ballast, only stipulating that the roadbed be kept perfectly dry and well drained at all times. This I believe to be a special necessity for the South and West, where stone is not to be procured at all. Is such a rail out of the range of possibilities? It is by many believed not to be. But it must be sought in a compound rail—one divided horizontally, with a cap and base, breaking joints, the former, in the open, upper joint, resting on the latter, which, extending 12 to 15 feet each way from that joint, so distributes the pressure on that weak portion of the rail as to prevent the sinking and sagging and puddling under the joint ties at present so common everywhere. Such a rail, by dividing the weight of the cap and base, even if as heavy as at present, need only weigh one-half in each of its parts. Such a rail can therefore be rolled sixty feet long as readily as it is now made half that length, and thus make only half the present number of joints. There will be no bolt holes punched under its heads to weaken it in that vital point, and the bolts may be placed coincident with the strain put upon them, avoiding much of the cutting and wear which occurs with fish-plate bolts. The rail, if in two horizontal pieces, will scarcely ever break, for a fracture or weak place in one bar cannot extend to the other, and two such weak places coming together is as unusual as for lightning to strike twice in the same place. Several other important principles seem to me to act in favor of a rail thus constructed, which shall be considered at a future time. Mean time, these hints are thrown out for the benefit of whom it may concern, if they prove to be worth anything.

INVENTOR.

CREEPING OF RAILWAY TRACK.

TO THE EDITOR OF THE RAILROAD GAZETTE.

This almost always occurs on a grade, the gravity of the iron carrying it down one or both sides of a hill, and leaving a large or small gap in the rail at the summits. Not infrequently a rail moves freely one way on a dead level, but pinches somewhere in shifting in the other direction. As the weather changes in temperature, the contraction and expansion of the iron in the track causes it to move or creep. The remedy is a very simple one, but seldom used, though it always should be, whether chairs or splice-bars are in the track. It is simply to cut a deep nick in each side of the foot of the rail, at its centre, as is done at the ends when chairs are used, and so spike it to the centre tie that the rail cannot move longitudinally without moving the tie laterally also.

IOWA.

—Jackson & Sharp, of Wilmington, Del., employ 300 men in their car shops.

HINTS AND SUGGESTIONS ON BALLASTING TRACK.

BY WILLIAM S. HUNTINGTON.

The importance of having tracks well ballasted is well understood by all railroad men, and the railway company which is possessed of a plentiful supply of good gravel, conveniently situated, may be considered fortunate. In some sections it is almost impossible to get a supply of even an inferior article, and ballasting in such localities is a very expensive operation. Ballast is frequently hauled a long distance and wasted by dumping on a high, narrow embankment, when it slides to the bottom, not a spoonful remaining where it can be placed under the track. There is nothing (except pay-day) that pleases a set of gravel-train men more than a high embankment, the longer and higher the better, with the ends of the ties projecting at either side, and situated about forty or fifty miles from the gravel pit. There, train after train may be dumped with very little labor, as the cars require no rocking, the gravel all leaving the car with a thin scraping sound at the first tilt is soon lying at the bottom of the embankment, and the men are ready for a long ride. The deep cut near by needs widening, sloping and ditching; but when the embankments have all been widened with gravel, the clay can be taken out of the cut and hauled off a dozen miles or more and dumped off from some bridge into a rapid stream, when the current will carry it off out of the way, to the comfort and amusement of train men. On some roads, however, little regard is paid to the comfort of gravel-train men, and the embankments are widened with material from the nearest cuts, gravel being considered too expensive, especially when it must be hauled a long distance. It seems a little singular that there is so much shammy, slovenly and wasteful work done on railroads under the plea of poverty, while yet these *poor* companies will allow gravel to be dumped into cattle guards, culverts, streams and swamps and wasted in every conceivable manner. There might be some show of an excuse for building a culvert or trestle-work in a loose manner under some circumstances, as they might be for temporary use; but there is none for this wilful waste of good gravel, and on some roads this waste is carried on to the extent of thousands of dollars. Gravel should never be dumped until the road-bed is in good condition to receive it without its sliding down embankments or being dumped into mud and mixed up with clay and slush so as to render it worthless as ballast.

Before dumping ballast, the road should be closely examined and all spikes, bolts, nuts, washers, rails, chairs, ties, etc., picked up; as tracklayers are particularly careless in leaving such property scattered about in in ditches, and if they are not saved before ballasting it is very likely they never will be. We have before called attention to the carelessness of tracklayers in this respect, but railroad men will bear frequent cautioning on all matters connected with the saving of property.

In some gravel pits there are a great many boulders, roots, stumps, etc., and it is common to load these with the gravel, as being the most convenient way to get them out of the way of the workmen in the pit; and it often happens that this trash is dumped in a cut where it is much trouble to get rid of it. Such as cannot be put into the track (and none of it should be) is left in the ditch, where it must either be removed or allowed to remain and clog the water course. Boulders and all stones too large to be used as ballast should be thrown to one side when the the train is out of the pit. They will be found useful for something, but they are not good for ballast when mixed with gravel. Thus it will be seen that these *poor* railway companies may waste a great deal of money in so simple an operation as hauling and dumping ballast.

Raising track for ballasting is not always conducted with as much care as it should be, especially when raising it to a considerable height. Frequently, a joint is raised on one side of the track at a time; when, if cast chairs are used, it is very sure to break off the lips, and also to rack and twist the joints, and put the whole track into disorder. This should be avoided as much as possible, and with a little care track may be raised to any height required for ballasting without doing any damage.

When the track is raised, and before filling with gravel, all ties should be put in their proper places, and held snugly up to the rail, and the spikes carefully drawn up—that is, driven home; otherwise gravel and small stones will work under the rail, between it and the tie. When ties are out of place, and the track filled with gravel, they are likely to remain so, much to the damage of the track, as has been shown.

In tamping, it is customary to tamp the ties their entire length; but it is found to be a bad practice to tamp as hard midway between the rails as at the ends of the ties, and a portion on the inner side of the rails. All track newly raised will settle more or less, and, if the middle of the track is tamped hard, it will cause it to rock and work out of line, as ballast will wash out from under the ends of ties when it remains hard and full in the centre. Such track will rock from side to side in a very disagreeable manner, and is sometimes dangerous, as ties are frequently broken from this cause.

It is best always to leave the gravel a little slack in the centre; not sufficiently so, however, to make a cavity for water to settle into, but so that the principal bearing will be mainly under the rails, or as near them as possible. With this manner of tamping, the stability of the track will be found much greater than when tamped hard in the middle.

Filling up and dressing off track is usually done according to the taste of those in charge of the work; hardly any two men having the same style of doing it. It is sometimes difficult to follow any given rule in dressing off; or to adopt any particular form in filling up, owing to a lack of ballast. At the first raising, it is not advisable to take extra pains in finishing off, as the track will settle so as to require considerable surfacing in a short time, and any extra finish it has received will be disturbed, and so much labor lost. The second time of going over it is the proper time to finish in good style. This is usually done by the section men, and it would be better to have section men do all the ballasting, as they are likely to take more pains with it than those who never expect to see the track again after the ballasting is done.

When there is a good supply of ballast, it is a good plan to fill midway between the rails, so that the ties will be covered to the depth of about three inches; commence the slope about a foot from the gauge side of the rails, and continue the slope so that there will be sufficient space under the rails, between the ties, for water to run off freely, continuing the slope so that at the ends of the ties the gravel will be about two inches lower than the top of the ties. As much gravel should be left outside the ends of the ties as may be, without interfering with the free passage of water from the track. If there is an over-supply of ballast, which is sometimes the case, all that cannot be used to advantage should be scraped into piles out of the way, and saved for future use, and not allowed to lay in heaps and ridges along the ends of the ties, preventing the escape of water, as is frequently the case. It is not advisable to fill track too full, on account of ballast being plenty, as it causes trouble in winter in repairing, especially in shimming; of which operation we shall have occasion to speak hereafter.

In filling track on curves, it is not best to slope the ballast from the middle of the track each way, as, the track being elevated, it will cause water to settle under the track. It is better to fill the track so that the slope will commence at or near the ends of the ties on the outer side of the curves, so as to carry the water across the track toward the inner side. The slope on the upper and outer side must be shorter and more inclined—sufficiently so to carry the water from the end of the ties, or perhaps a little to the outside of them, into the ditch. It will be seen that by filling track on curves as is generally done on straight lines, *i. e.*, sloping from the middle each way, a portion of the water must settle under the track or run up hill, which latter it is not likely to do. In short, the main object in view in filling up and dressing off track should be in all cases, to make the surface of such form as to prevent the settling of water under the ties.

There is a great deal of iron damaged in ballasting by allowing trains to run over track before it is well tamped up. When track is raised considerably and only the joint ties, and perhaps one or two intermediates, partially tamped, a train running over the track in this condition, will bend the iron surface-wise, so that it is impossible to straighten it again without heating it; and there will be kinks in it the best that can be done with it after once being badly bent on the surface. By good management there is no need of a train passing over track until it is well tamped. It is an easy matter to have the track ready for all regular trains, and it is better to stop a working or irregular train than to allow it to run over track before it is ready. To some, this caution may seem unnecessary, but there is a great deal of very bad track made so by the spoiling of the iron in this way, while ballasting.

We have given some hints on filling track when plenty of gravel is at hand, and we will now give some instructions as to how the work should be done when there is a scarcity of that material. It is said that a good cook can prepare a very palatable meal with almost nothing to make it of, whereas a poor cook will almost breed a famine when there is plenty to eat. So with track men: some will put a piece of road in good order and keep it so with a very small allowance of ballast, which is "the needful;" while others, with abundance, will make but a

sorry show. It is the practice with most track men, when but a small quantity of gravel can be had, to put it all under the ties, leaving nothing to fill between the ties, they considering the proper place for the ballast to be under the track.

This is a mistake. However small the quantity of ballast, the track should not be raised so high as to require all the gravel under the ties, but a portion should be reserved to fill between the ties and at the ends. Let us examine a piece of track with little or no material between the ties, where the road bed and the ballast are of a light sandy nature. Some of the ties will of course have a solid bearing, while others will hang loosely by the spikes, having no bearing at all except when the rail is deflected by a passing train; and as soon as the train is relieved of its load it springs back to surface, taking with it the ties holding by the spikes. With this cavity under the ties, the sand is forced out from under them by compressed air escaping as the tie is suddenly forced into its bearing. Each tie operating as a bellows to blow the sand from under it, thus continually working its way into the road bed, while those ties having a solid bearing are not so affected. Anyone having any doubts of the truth of this may be convinced of its truth by sitting close to the track when a train is passing. He will notice a jet of loose sand escape from under every loose tie, forced out by the rush of air caused by the sudden settling of the tie into the cavity, literally *pumping* the ballast from under the track. There is no way of preventing this when the road-bed is not of sufficient width to prevent the ends of the ties projecting over the slope, which is often the case on unfinished roads, and, not infrequently, on roads considered finished. It is best always to fill track between the ties and at the ends sufficiently to keep water from settling under them and also to keep air from under them. Perhaps it may be said that no air can get under the ties if they are well tamped. This is another mistake, as the pressure of a locomotive or heavily loaded car will force the tie into the road-bed more or less, causing the sand, mud or clay, or whatever is under it, to rush out at either side; and when the rail comes back to its proper position, it brings the tie with it, thus forming the cavity above mentioned. Fill the track with something; if it is with nothing but mud or clay from the ditches at the side of the track, it is preferable to *air* for ballast, and if track is well filled with even a poor material, it will keep in order much longer than with an insufficient quantity of good gravel, with none between the ties.

One great trouble in ballasting is the raising the track too high for the amount of ballast at hand. This is often caused by the desire of the trackman to put the track on a true grade, leaving no sags. This is very desirable, but it is far better to leave sags and have ballast enough to fill the track properly, than to take it up to a true grade and leave it naked. Of course a short sag looks bad, and we can hardly censure a trackman for taking it up, even with scarcity of ballast; but stability should not be sacrificed to appearances. How often do we see a piece of track at the foot of a steep grade, on a high embankment, *piked up* as far as possible, with every available spoonful of material put under the track, the ends of the ties projecting over the slope of the embankment, squirting ballast as every train passes, requiring the constant attention of the section men to keep the track in anything like a safe condition, when, by leaving a slight sag, it might be kept in tolerable running order with half the labor that is required in its present elevated condition. It is not best to be too particular in bringing track up to a true grade on new roads, as the road-bed will settle, and on heavy fills it will require raising several times before it will remain up to grade. It is well enough to pay some regard to looks; but in this, as in many other affairs, there is such a thing as carrying it too far for profit. It is impossible to keep track in line when it all lays above the ballast, as there is nothing to steady it and keep it in place. An old-fashioned outside-connected locomotive will throw such track out of line at a remarkable rate, and where such engines are used, it requires constant attention to keep track that is not properly ballasted in anything like good line.

The elevation of curves is a matter that has occupied the attention of trackmen and engineers to a considerable extent ever since the commencement of railroad building in this country. Formerly it was the custom to give curves a greater elevation than is the practice at present. The views of engineers differ widely in this matter, some claiming the no elevation is necessary, while others argue that a proper elevation is indispensable. What some would consider a proper elevation would not be considered enough by others, and the amount of elevation varies considerably on different roads throughout the country. The theories on the elevation of curves advanced by some eminent engineers have not been verified by experience. The amount of elevation is usually left for trackmen to decide upon; but this matter properly belongs to the engineers to determine, and the amount of elevation should be marked on the centre stakes, as well as the degree of curvature, to serve as a guide in ballasting. This subject will receive further attention in a future article.

Semi-Annual Report of the Great Western Railway of Canada.

We give below a summary of the report of the Great Western Railway Company of Canada for the half-year ending January 31, 1870:

The receipts on capital account amount to £207,579, principally from payment of second instalment, December, 1869, on the 5 per cent. preferred stock. The first annual series of 4 per cent. bonds issued to government in settlement of loan, £142,204, due 1st January, 1870, was paid. The aggregate expenditure at 31st January amounted to £5,487,437, leaving balance to credit of capital account of £96,817.

The outlay on capital account amounted to £94,844 (deducting proceeds of surplus lands sold), and included 55 broad-gauge flat cars—2 twelve-wheel narrow-gauge baggage cars—369 narrow-gauge freight cars—patent rights for platforms and brake—8 7-10 miles of sidings, etc. The directors authorized the construction of the freight cars in order to obviate the cost of hiring cars to conduct the large "Blue Line" business. The cost of laying 1,100 tons of steel rails has been charged to revenue.

The receipts and expenses for seven corresponding half-years were:

RECEIPTS.

Half year ending Jan. 31.	Pas'g'rs, mails & sund's.	Freight and live stock	Rents.	Total.
1864	£129,684	£171 329	£ 21	£301,634
1865	154.125	157,874	730	312,730
1866	105,131	181,071	837	387,039
1867	168,986	161,254	1,273	331,513
1868	186 53	213,476	809	400,813
1869	183 703	238,764	846	423 312
1870	183,741	239,535	907	424,183

EXPENSES.

Half-year ending Jan. 31.	Incind'g renewals.	Pr. ct. of gross receipts.	Work'g expenses per train mile
1864	£171,336	56.80	4s. 9¼d.
1865	168,577	53.91	5s. 1¼d.
1866	170,0 3	43.93	4s. 6¾d.
1867	166.632	50.26	4s. 7¼d.
1868	193,667	48.31	4s. 5¾d.
1869	209,752	49.55	4s. 3¾d.
1870	243.3?8	57.37	4s. 9½d.

The slight increase in local traffic over corresponding half year—£810—is nearly balanced by the decrease in through traffic.

The reduced rates for through freight were protracted till the end of October. The tonnage per mile has increased 10 per cent over the corresponding half year, but the receipts have decreased by £14,720. The excessive expenditure on maintenance and renewals consists entirely of outlay for rails and fastenings, and wages of platelayers, and principally occurs in November, December and January. The engineer in October found the renewals to that time insufficient to carry the increasing traffic safely through the winter, with speed to insure through connections; and the main track having deteriorated to a greater extent than he had anticipated, rendered increased outlay necessary.

The dividend to 31st January on 5 per cent. preferred stock amounts to £8,060 15s., leaving balance of £99,697. From this the Directors recommend a dividend on the ordinary shares at rates of 5½ per cent. per annum, free of income tax, payable 28th April, which will absorb £97,642. The balance to be carried forward to the credit of next half year will be £2,054. The renewal fund for the ferry steamers now amounts, with interest, to £15,-875. The loss on conversions of American currency for the half year amounts to £37,156, as compared with £70,-362. The average rate of conversions was 126; average price of gold 131¾. The assets in American funds 31st January, 1870, amounted to $182,009.09, against $218,-635.41, at the commencement of the half year.

Report of the Grand Trunk Railway Company.

A press of other matter has prevented our giving before the report of the Grand Trunk Railway Company of Canada for the half-year ending December 31, 1869. We now give the following abstract of the report:

EARNINGS AND EXPENSES.

Dec., half of 1868.		Dec., half of 1869.
£756,163	Gross receipts, including Buffalo and Champlain lines	£791,193
499,557	Working expenses of 61.44 of corresponding half year	£484,571
126,772	Renewals, etc., of the permanent way and works debited to revenue	73,745—558,316
£179,964	balance earned	£232,877
43,318	loss on American currency	32,899
£136,586	Net balance	£199,978
		199,978
	Add balance from net revenue account of last half year	18,754
	Total balance	£218,732
	Deducted postal and military revenue due to postal bondholders	18,769
	Balance	£199,963
	Applicable for the following payments, viz:	
	Atlantic & St. Lawrence lease (in full)	£32,486
	Detroit line lease (in full)	11,250
	Montreal & Champlain Railroad Company	13.884
	Buffalo & Lake Huron Railroad Company	43,750
		£100,870
	Equipment bond interest	12,000
	On account of 1st preferred interest	67,737
	Balance	1,619
	Total	£199,963

The interest on the first preferred bonds will be paid in full for half-year.

The total miles of railway re-laid with new iron during the half year was 109¼ miles against 88½ miles in 1868. The cost of re-rolling the rails at Portland and Detroit has been reduced from an average of $55, in 1865–66 to about $36 a ton. The loss on conversion of American currency was less by £10,418 than in the corresponding half-year. Should the premium disappear altogether this company will be saved a direct loss of net revenue which has for seven years averaged upwards of £65,000 per annum.

The most cordial relations exist between this company and the Great Western Railway Company in the policy of using joint stations where practicable. Arrangements have been completed by which that company work over the Grand Trunk tracks at Toronto; and negotiations are pending by which the Grand Trunk station at Guelph and the Great Western station at London will be jointly used. It is expected that two of the narrow gauge railways which are to run into Toronto will be completed, in part, during the present year, and arrangements are in progress for use of the Grand Trunk station.

The prompt response to the recent circular offering £228,000 of the second equipment mortgage bonds, the applications for which exceeded £1,300,000, was very gratifying. The capital so provided has enabled the Directors to authorize the necessary outlay for some of that reproductive expenditure which has remained in abeyance for so long a time, and instructions have been sent to immediately construct 12 engines and 12 first-class passenger cars. These, with the cars which Mr. Pullman's company has agreed to place upon the road by the first of July next, will entirely change and improve the passenger service of the line. Full provision has also been made for a large increase in emigrant passenger traffic. As regards rolling stock for the freight traffic, the extra supply needed for present wants has been found outside the company's own resources. The Montreal Car Company is delivering 500 cars at the rate of ten a week. The additional 300 changeable gauge cars, it is expected will be running at the close of the current year. So great is the demand by freighters at Chicago and Boston for this car that extra rates are readily obtained. They have been run most successfully, as regards both profit and freedom from accident.

The works of the Intercolonial Railway have been suspended; but with the return of spring the several sections under contract will be energetically proceeded with. The Commissioners have invited tenders for 40 engines, 250 box and 150 platform cars, with a view to certain lengths of the line being opened next year. The railway will no doubt bring to the Riviere du Loup branch a considerable increase of traffic during the coming summer, and this line affording continuous communication on the same gauge from Halifax to Lake Huron, must be beneficial generally to the Grand Trunk.

Local Travel.

FROM THE MASSACHUSETTS COMMISSIONERS' REPORT.

Local travel is the manufacturing movement of our community; it is peculiar to it. Railroads through agricultural districts must depend on through travel, for no other exists; those from mining regions look to a mineral movement, and travel is of secondary importance; but with us a ready and economical internal communication is a first essential of development. Unfortunately the cheap and easy intercourse for very short distances between all connected neighborhoods is a class of business, which, as is apparent from the tables above the roads do not naturally encourage. It crowds the cars, necessitates frequent stops, the single fares received are small and too often unaccounted for by dishonest conductors, while much labor is devolved on the employes of the road. The subject, however, is none the less important to the crowded settlements of a manufacturing community, and, from the artisan going home from his work, down to the child on its way to school, this question deeply interests every resident on a line of railway.

—A Philadelphia correspondent of the *Iron Age* says: "Is it generally known that the *very* first railroad laid "and operated in the United States was built in Delaware "County, in this State? This road connects the granite "quarries of Avondale with tide-water, and was built "by Thomas Leiper, in 1806, for the transportation of "stone. The ascents were graded inclined planes, and "the superstructure of white oak with crossties and "string pieces. The cars and trucks were very similar "to those now used, the wheels being of cast iron with "flanges. This road is now being relaid and adapted to "steam by Messrs. Leiper & Lewis, the former a grand-"son of the original founder, and still working the same "stone quarries. But sixty-four years ago but this one "mile of road existed in the United States. Calculating, "even with the same ratio of progression as has existed "since, what will be the railway system of the country "in the year of grace, 1934?"

—The London *Railway News* copies a bill of fare of one of Pullman's hotel cars and adds, by way of Comment: "Railway travelers will read with something like feelings of envy the arrangements made for the supply of creature comforts in the famous Pullman traveling cars, as compared with the unsatisfactory state of things provided upon too many of our English and continental lines."

—The Senate Committee on Commerce has reported unfavorably to a proposition to make a survey of the proposed James River & Kanawha Canal.

RAILROAD EARNINGS FOR APRIL AND SINCE JANUARY 1.

The railroad earnings for April are not conspicuous for any important differences from the same month of 1869, with the exception of the Northwestern, Rock Island, and Ohio & Mississippi, which show some noticeable variation. The month seems to have been a very fair one for traffic, and in the majority of cases the earnings have been on the "increase" side. The improvement in the price of grain, at the West, may possibly have some effect in stimulating the freight business during the next month, although the greater number of those who have held grain until the present time, will be apt to hold it for still higher prices than those now current. An important consolidation has taken place since our last article upon earnings, in the absorption of the Lake Shore & Michigan Southern road by the Vanderbilt party, thus forming a line from New York to Chicago wholly under one management. As might have been anticipated under the circumstances, the public is to have no more reports of earnings from the Lake Shore Company. The Chicago & Alton road reports an increase in mileage of thirty-four miles, worked during the last half of the month, making the whole length of road 465 miles, against 431 in 1869.

EARNINGS FOR APRIL.

	1870.	1869.	Inc.	Dec.
Chicago & Alton	$334,653	$323,390	$2,643	$...
Chicago & Northwestern	950,736	1,112,194	....	161,553
Chicago, Rock Island & Pacific	443,300	362 961	80,339	....
Clev., Col., Cin. & Ind'apolis	216,046	247,661	....	1,615
Illinois Central	597.571	568.282	29,269	....
Michigan Central	414,630	411.814	216	....
Milwaukee & St. Paul	443,133	46 ,287	....	17,154
North Missouri	269,490	149,184	120 306	....
Ohio & Mississippi	270,933	214.409	56,524	....
Pacific of Missouri	289,550	278,246	11,304	....
St. Louis, Alton & Terre Haute	*168,705	171,868	....	3,163
St. Louis & Iron Mountain	104,019	.....	....	....
Toledo, Wabash & Western	318,699	311,832	6,867	....
Total	$4,848,765	$4,617.124	$311.088	$183,485

*Fourth week estimated.

For the period which has elapsed since the beginning of the year the leading roads show quite dissimilar balances, several of them having increased their earnings above those of 1869, and others showing a decided falling off. The table which follows presents the total earnings of the principal companies for the first four months of the year in 1870 and 1869:

EARNINGS FROM JANUARY 1 TO MAY 1.

	1870.	1869.	Inc.	Dec.
Chicago & Alton	$1,296,822	$1,371,976	$....	$75,154
Chicago & Northwestern	3,309 437	3,955,759	...	646,322
Chicago, Rock Island & Pac.	1,648,000	1,669,958	....	21,958
Clev. Col Cin. & Ind	910,307	872,523	37,784	....
Illinois Central	2,559,923	2,460,058	99,845	....
Michigan Central	1,459,579	1,508.09	....	48,517
Milwaukee & St. Paul	1,599 127	1,664,602	....	65,475
North Missouri	917,9 9	500,09	417,864	....
Ohio & Mississippi	939,020	832.314	109,706	....
Pacific of Missouri	1,035,919	973,962	61.957	....
St. Louis, Alton & Terre Haute	6 6,759	608.258	48,501	....
Total	$16,522,852	$16.412 601	$792,657	$858.589

—*Commercial and Financial Chronicle.*

WORKING OF EUROPEAN RAILROADS.

The table which we give below conveys at a glance the results of the working of the leading railways of France, and it may be studied with advantage in connection with similar tables given a short time since in the *Railway News*, respecting the English railways. The figures given point to a certain fixed quantity obtainable from the working of our railways—a quantity determinable by the number of the locomotives and the amount of rolling stock. As a rule, it may be taken that a locomotive, a carriage, or a wagon, pays for itself in two years. The result will, of course, be affected, to a certain extent, by minor details, such as the power and capacity of the engines and carriages, but circumstances being equal, it will be found that there exists a very curious and unvarying connection between the gross earnings of a railway and its amount of working stock. Let us take, for instance, the Midland Railway. It has 623 locomotives, at an average cost of, say, £2,500. Multiply the number of the locomotives by 5,0 0, or twice their actual cost, and the result is a gross income of £3,115,000. The figures actually returned were £3,139,000, The carriages and wagons were 16,836 in number. For convenience of reckoning we place them at an average of £10 each, and multiplying the total number by twice the cost, we get a gross sum of £3,367,200. The mean of the two would be £3,241,000; the actual receipts being, as we have said, £3,139,000. The average of £100 in this case is probably too high, considering how large a proportion of the rolling stock is made up of mineral wagons and trucks. The Great Western has 842 engines. Tried by the same test they should produce £4,210,000, and its 2 ,500 carriages and wagons £4,100,000. The mean would be £4,155,000; the total receipts were in fact £3,950,000. The London and Northwestern has 1,443 locomotives; they should produce by this test £7,215,000, and their 31,000 carriages and trucks £6,200,000. The mean earnings of both would give £6,707,000; the actual earnings were £6,800,000. The North Eastern has 65,000 carriages and trucks. A very large proportion of these are, however, those small chaldron trucks, of which so much has been said in some former discussions relative to this line, and the same figures could not be applied in this case. If, however, the cost—which may be taken as an indication of the carrying capacity of the rolling stock—were ascertained and worked out, it would probably be found that even in this case the 61,000 coal and mineral trucks earned their cost price every two years. The amount of rolling stock possessed by a company affords a fair and ready means of arriving roughly at the gross receipts of the railway. There are of course, limits to the amount of earnings of a railway, and it is possible that a railway may be over-burdened with rolling stock, though such a state of things has never yet come under our notice. No more profitable expenditure of money can be made than outlay upon rolling stock. The experience of the working of railways in every country confirms the opinion; and it would appear to be the worst possible policy for directors to starve a railway, or for shareholders to object to a liberal outlay upon this branch of expenditure, even when it trenches to some extent upon the annual income of a railway. It may be a departure from the "severe" principle of debiting all working charges to revenue, to apply capital to the purchase of rolling stock; but it cannot be objected to on the ground of its being an unproductive outlay, seeing that every locomotive pays for itself in so short a period.

The following table shows the rate of working expenses in francs and dollars per kilometre and per mile of the French and some other foreign railways:

Lines	Length Old reseau	Length New reseau	Length Total in miles.	Gross receipts Old reseau Per kilo.	Gross receipts Old reseau Per mile.	Gross receipts New reseau Per kilo.	Gross receipts New reseau Per mile.	Percentage of expenses Old reseau	Percentage of expenses New reseau	Train mileage receipts. Old reseau Per train kilo.	Train mileage receipts. Old reseau Per train mile.	Train mileage receipts. New reseau Per train kilo.	Train mileage receipts. New reseau Per train mile.	Cost Per kilo.	Cost Per mile.
	kilos. miles	kilos. miles	miles.	francs dols	francs dols	francs	do s.	per ct.	per ct.	francs	dole.	francs	dole.	francs	dollars
Northern of France	1066 662	329 204	866	79357	25397	18656	5970	42.50	133.10	5.70	1.82			460000	1470000
Paris to Lyons & Mediterranean	2073 1287	1758 1092	2379	81977	26232	26232	8519	34.33	48 84	7.61	2 43			625100	1640000
Eastern of France	977 606	1922 1194	1800	63077	20184	26235	8424	40.39	53 41	5 94	1.67			1164000	3720000
Southern of France	797 495	932 579	1074	45671	14614	11812	3780	35.18	74 64	7.57	2.12			1147000	3670000
Orleans of France	9017 1232	1312 818	2065	42174	13495	17257	5714	33 11	51.28	6.14	1 96			1165000	3730000
Western of France	940 559	1269 788	1347	65073	21111	7300	5.306	66.15	66.15	5.72	1.83			1165000	3730000
Charentes of France	72	296 902	274	14660	4670									1165000	3730000
Ceinture (Cmin. ry., Paris)	117		1014	131550	429.66			42.98	86 00					1165000	3730000
Prussian Railways	9075 5635		5635	353900	113118			42.08	84 10					1165000	3730000
Other German Railways	5831 3615		3615	275304	88101			52.10	104 20					1165000	3730000
Austrian Lines	6057 3761		3761	379148	2 41			33 98	67 96					1165000	3730000
Austrian State Railways	1393 921		921	511867	16437			36.13	72 26					1165000	3730000
S. Austria & Upper Italy	3896 2119		2419	311100	99532			38.70	77 40					1165000	3730000
Belgian State Railway	862 535		535	463969	14838			60.73	121 46					1165000	3730000
Madrid, Sragos. & Alicte	1498 867		887	196244	6247			44.09	88 18					1165000	3730000
Northern of Spain	723 449		449	25515	8148			40.8	81 60					1165000	3730000
Pampeluna & Barcelona	619 384		384	15351	4912			52.96	105 92					1165000	3730000
North Western of Spain	228 141		141	62340	2?**			79 67	159 34					1165000	3730000
Portuguese	3315 1968		3.5	11842	3780			77 05	154 10					1165000	3730000
Italian R'ys (as a whole)	4950 3073		3073	15976	5112			68 38	136 76					1165000	3730000
South Italy	1303 809		809	8946	2850			90 69	181 38					1165000	3730000
Roman Railways	1689 1044		1044	1430	3057			66 00	132 00					1165000	3730000
St. Petersburg to Warsaw	1289 800		800	257000	8224			63 90	127 80	4.14				1165000	3730000
St Petersburg to Moscow	650 403		887	196244	6247			44.09	88 18	7.40				1165000	3730000
Moscow to Nijni	497 271		4.3	33732	1.600			49 29	98 58					1165000	3730000
Swiss Central	248 154		271	54632	17488			45 13	90 26					1165000	3730000
Western Swiss	331 206		154	33830	10-43			42.56	85 12					1165000	3730000
Swiss Union	275 171		205	22080	70 40			39.00	78 00					1165000	3730000
			171	15013	5.092			47 81	95 62					1165000	3730000

REMARKS.

Northern of France.—Interest and dividend 61 fr. per share of 500 dols., quoted 1,000 fr.

Paris, Lyons & Marseilles.—Dividend 60 fr. per share of 500 fr., quoted 980 fr. and interest.

Eastern of France.—Interest and dividend, 6.66 per cent.

Southern of France.—Dividend, 40 fr. per share of 500 fr., or 8 per cent.

Orleans of France.—56 fr. per share of 500 fr., quoted 780 fr.

Western of France.—Interest and dividend, 34 fr. per share, 6.80 per cent.

Charentes of France.—Interest paid, no dividend.

Ceinture.—40 per cent. of the expenses consist of tolls paid to the five great lines; net profits in 1868, 311,964 fr.

Prussian Railways.—Dividend and interest, 6⅛ per cent.

Other German Railways.—Average yield, 7 per cent.

Austrian Lines.—Average yield, 6⅝ per cent.

Austrian State Railways.—Revenue 52.50 per share of 500 dols.

South Austria and Upper Italy.—Revenue 33 dols. per share of 500 dols.

Belgian State Railway.—Revenue 4.84 fr. per cent.

Madrid, Saragossa & Alicante.—No interest; bond coupons unpaid.

Northern of Spain.—No interest; bond coupons unpaid.

Pampeluna & Barcelona.—No interest; bond coupons unpaid.

North Western of Spain.—Interest paid on construction account.

Portuguese.—Net profits, 1,360,000 dols., applied to coupons of bonds.

South Italy.—5 per cent. interest.

Roman Railways.—No interest either on bonds or shares.

St. Petersburg to Warsaw.—Interest paid on shares, no dividend.

St. Petersburg to Moscow.—Net profits, 10,000,000 dols.

Moscow to Nijni.—Net profits, 13,000,000 dols.

Swiss Central.—Interest paid on shares and bonds.

Western Swiss.—Interest 5 per cent. and 22.90 fr. dividend on shares of 500 fr.

Swiss Union.—Interest 5 per cent. and 15 dols. dividend.—*London Railway News.*

Liabilities of a Corporation to its Employes for Injuries Caused by Defective Mechinery.

We find the following report of a case recently tried by the Superior Court of Missouri, in the St. Louis *Republican*. The parties were the Pacific Railroad Company of Missouri and George W. Gibson, formerly a brakeman in the employ of that company:

In this suit the respondent, a brakeman of the railroad company, sought to recover damages against the company for injuries received, it was alleged, from the company using defective machinery on its road.

Respondent was engaged in inserting the link between two cars, while the train was backing on a switch, when his hand was caught between the two buffers and so injured that he lost three fingers.

Evidence was given in the court below that the officers of the road and the head mechanic who had charge of the machine shops were skillful and competent, but it was very clear that the coupling apparatus was dangerously defective, and judgment was given for the respondent. An appeal to the supreme court followed.

The objections to the action of the circuit court refer to the giving and refusing instructions.

The first instruction was to the effect that if the apparatus used for coupling was unsafe and the defendent knew thereof, or might have known, then detendant is liable to plaintiff for any injuries he has received in consequence of such defect—if at the same time plaintiff exercised ordinary care and prudence, and did not know the defect in the apparatus.

The second instruction was directed to the amount of damages and was not objected to.

The appellant, that is the company, asked for five instructions, and three were given. The first was, in substance, that though the car by which the plaintiff was injured had too short a spring, yet if the Directors and Superintendent of the company were ignorant of the defect, and exercised due caution in procuring its cars, then the company is not liable.

The second instruction was that if the Pacific Railroad Company employed skilful and competent men to inspect and control the cars on its road, and used proper care in constructing its cars, the plaintiff, who was a servant of the company, could not recover.

The third instruction was that the plaintiff, as a servant of the company, assumed all the risks pertaining to the work he undertook, and if he was injured by the negligence of another fellow-servant he could not recover.

The fourth and fifth instructions were refused.

In regard to the risks of workmen the Court said: "A workman or servant, on entering upon any employment, is supposed to know and assume the risk naturally incident thereto; if he is to work in conjunction with others he must know that the carelessness or negligence of one of his fellow-servants may be productive of injury to himself; and besides this, what is more material as affecting his right to look to his employer for damages for such injuries, he knows, or ought to know, that no amount of care and diligence by his master or employer can by any possibility prevent the want of due care and caution in his fellow-servants, although they may have been reasonably fit for the service in which they are engaged."

"It is neither unjust nor unreasonable that the consequences which the servant or workman must have foreseen on entering into an employment, and which due care on the part of the employer or master could in no way prevent, should not be visited on the latter. But it is otherwise when injuries to servants or workmen happen by reason of improper and defective machinery and appliances used in the prosecution of the work. The legal implication is that the employer will adopt suitable instruments and means with which to carry on his business. These he can provide and maintain by the use of suitable care and foresight; and if he fails to do so, he is guilty of a breach of duty under his contract, for the consequences of which, in justice and sound reason, he ought to be responsible. (Snow vs. Housatonic Railroad Company, 8 Allen, 441, per Bigelow, Chief Justice; Coyzer vs. Taylor 10 Gray, 274; Seaver vs. Boston & Maine Railroad, 14 Gray, 466). Any other rule would be productive of the greatest injustice and wrong. The servant has no control over the master. He acts in subordination. He relies wholly on the judgment of the master that suitable machinery and the needful requirements are supplied. He has not the means nor the opportunity of knowing whether those furnished may be safe. His attention is exclusively due to the peculiarities incident to his branch of the employment. He assumes the risks, more or less hazardous, of the service in which he is engaged, but he has a right to presume that all proper attention should be given to his safety, and that he shall not be carelessly exposed to risks not necessarily resulting from his occupation, and which might be prevented by ordinary care and precaution on the part of the employer."

In England the principle had been firmly established that a servant could not recover of his employer for the negligence of a fellow-servant, but the courts in the same country universally held that the master will be liable for ordinary neglect in the use of defective machinery or apparatus from which injury results.

The Court then cited a variety of English, Scotch and American authorities, and after stating that the company fully recognized the defect, and were altering and improving the cars so constructed, said: "The instruction for the respondent is well supported by authority and is founded in reason. If by reasonable and ordinary care and prudence the master may know of a defect in the machinery he operates, it is his duty to be advised, and not needlessly expose his servants or employes to hazard, peril or mutilation.

The Court in conclusion said that they had been unable to discover any error in the record—that the law had been properly declared, and a fair trial given. The judgment was therefore affirmed.

General Railroad News.

MECHANICS AND ENGINEERING.

Rules for Shrinking on Cast Steel Tyres.

Messrs. Thomas Prosser & Son, the Agents in the United States for Krupp's cast steel locomotive tyres, give the following directions for shrinking on these tyres:

"In shrinking on Krupp's cast steel tyres, it is only necessary to allow one ninety-sixth of an inch for each foot of the diameter of the wheel, or one in eleven hundred and fifty-two, which is one-twentieth of an inch for a wheel of 57 6" diameter.

Steel expands 1 in 157,200 by each degree (F) of heat, hence, 137° F, is all that is required to expand it 1 in 1,152. Practically, however, we may adopt as a standard, the fusing point of tin or 445° F, as an all sufficient temperature to expand the cast steel tyres without any danger of over or unequally heating them, for the latter must be carefully guarded against. Now, as to the strain put upon the cast steel tyre, it is difficult to calculate: but, if we assume the cast iron wheel to be compressed as much as the cast steel tyres are expanded by a shrinkage of 1 in 1,152, that strain will amount to 12,586 lbs. per square inch, which is about one-tenth of its ultimate cohesion.

A climate fall of 100° F, will increase the strain upon the cast steel tyre to 12,987 lbs. per square inch; for the steel will shrink 1 in 1,570, while the cast iron wheel will shrink but in 1,620, while on the other hand, an increase of temperature of 100° F, will merely reduce the strain in the same ratio.

The best way of fastening the tyres upon the wheel is to turn a stop or fillet upon the tyre, with a corresponding recess upon the wheel. on the outside, and rivet the former over the latter, upon the inside.

If, however, screw piles are preferred, they should be screwed into the rim of the wheel, leaving a plain pin only about half an inch long, to enter the tyres."

Rails.

An English patent covers an improved method of connecting rails together by punching or cutting out a slot in the middle of the end of each rail, the rail being laid on its side. Into one of these slots the inventor slides one-half of a fastener made of iron and steel, by preference of about double its length; the end of the next rail is then slid on the other half of the fastener, the sides of which are made to project above and below the slots which hold and secure the rails and prevent them moving sideways, while the part in the slot prevents them moving up or down. By making the slot in one rail a a little deeper than in the other, room is left for the insertion of a spring key, which by its play sideways admits of the contraction and expansion of the rail; if the space between the ends of the fastener and the slot is small the spring key need not be used.

Improvement in Permanent Way.

According to a patent recently obtained by Mr. S. Fox, of Deepcar, near Sheffield, it is proposed to support the ends of the rails where they are joined or connected to one another by a portion of a rail placed beneath them in order to prevent the lines of rail when a train passes over them from deflecting more at the point where they are connected together than at the points where a solid rail passes from one chair to the next. The two ends of the rail are hammered or flattened out to rest upon two sleepers between which the joint or connection of the rails occurs, and pass under the chairs which support the rail, in order that the spikes which fasten the chairs to the sleepers may secure the flattened ends; the flattened ends are split longitudinally for a short distance, and bent outwards, so that one portion of the end may come under one end of a chair, whilst the other comes under the opposite end. Holes are punched or formed in these ends to correspond with the holes through the chair, so that the spikes or treenails which secure the chairs to the sleepers may also pass through these split ends.—*Mechanics' Magazine.*

Heavy Work on a Mexican Railroad.

The difficult engineering works at and near Chiquihuite, on the railroad now in progress between Vera Cruz and the City or Mexico, are described as follows in the *Diaro Official:* "After leaving the station of Paso "del Macho, the road passes, by means of a bridge 300 "feet long and 100 feet high, that immense neck of land "which separates the base of the first level portion of "the Cordillera from the plains of the *tierra caltente*, or "the hot country. This bridge, the mason-work of "which is entirely finished, only lacks the iron floor in "order to be opened to the public. Having passed this "great work we arrive, by a series of curves as boldly as "scientifically run, at the great bridge of San Alejo, "which is not as high as that of Paso de Macho, but several feet longer. From San Alejo to Chiquihuite there "is nothing but deep cuts through the solid rock, and "enormous terrepleins, making the great inequalities of "that broken ground entirely disappear. Chiquihuite "Bridge, which is over 300 feet long, is elevated more "than 150 feet above that abyss where the foaming cold "stream that gives its name to this part of the mountain "forever leaps and boils. The boldest spirit would not "suspect the real *tours de force* conceived in "the running of this road accomplished by the skill "of Mr. Buchanan, and completed under the direction of "Mr. Braniff, chief of construction. On leaving the "bridge, the road follows the main highway for some "distance, by a terreplein of 60 feet high, supported by "a wall 10 feet thick, and suddenly, as in the shifting of "scenes in a theatre, the road runs around the mountain, suspended on its sides. It was necessary to cut it "through solid rock, of which the side of this mountain "is composed. The laborers engaged in this unequal "piece of work have to hold on to the rocks, and are "held up by ropes, which makes them resemble at a distance bees in a honeycomb. The road continues for "about 100 metres along that track before it enters the "first tunnel of 150 feet in length; it again reappears "only to continue its aerial route, and again disappears in "a tunnel of 350 feet. From this tunnel the road passes "over a small iron bridge, raised 800 feet above the "bottom of the ravine."

Permanent Way.

Mr. G. P. Rose, of Elmira, New York, has secured an English patent for a permanent way which is described by the London *Mechanics' Magazine* as follows:

"The wooden stringers or timbers, which in practice "will rest upon suitable ties, and upon which the rails "are secured by wood screws with elongated heads, "whose width is equal to the body of the screw, while "the projecting heads upon opposite sides acting as "flanges, will allow them to grasp and hold the foot of "the rail to the stringer. When it is required to release "the rail from the stringer, it may be done by giving the "screws a quarter of a turn, thereby disengaging the "head from the rail foot. The ends of these rails are "halved together as shown; the one lapping by and "abutting against the other. A chair and fish plate "combined made in two sections receive the foot of the "rail, and are fitted to the flat or concave sides of the "web of the rail, in reference to which they are so situated that the overlapping ends of the rail will be "about the centre of the length of the chair and fish "plate."

OLD AND NEW ROADS.

United Railroads of New Jersey.

Of these roads, embracing the Camden & Amboy, the Philadelphia & Trenton, and the New Jersey Railroad, forming two parallel lines between New York and Philadelphia, the *Stockholder* says: "The New York & Philadelphia line (United Railroads of New Jersey, Etc.), "dispatch twenty-eight trains between these cities daily "(Sunday excepted), that is to say, fifteen from New "York to Philadelphia, and thirteen from Philadelphia "to New York. These railroads now run each day "(Sundays excepted), one hundred and eight rains of all "sorts, more than any other railroad company in this "country, or, we believe, in the world. These trains are "started within an aggregate diurnal space of about "twenty hours; the number dispatched, one hundred "and eight, implies the setting-out of a train about every "eleven and one-half minutes on an average during the "active day. But of course some must be placed even "nearer together than that in the busier part of the day.

The Erie in Cincinnati.

Jay Gould was in Cincinnati on the 12th inst., and reported that his relations with the Cincinnati, Hamilton & Dayton Railroad are entirely satisfactory. It is said that the object of his visit is to lay firm hold on Cincinnati, and perfect connections there with the West and South. The impression prevails that the energies of the Erie will henceforth be powerfully expended in that direction, and that emigrants to the West, and through travel generally, will, as far as possible, be brought there, and sent over the Ohio & Mississippi road.

Owensboro & Russellville.

James Weir, President of the company, informs the stockholders that the prospects are flattering for the early completion of this road. He expects trains to run as far as Green river in August. The Board of Directors have ordered suit brought on all stock subscribed but unpaid.

St. Louis & St. Joseph.

Some fifteen miles of the road, on the line between Sparta and Lathrop, are still uncompleted. Trains are now running regularly from Lathrop, about thirty-three miles from St. Joseph, to Lexington, connecting with the North Missouri road. The President announces that the road will be finished and through trains run over the line to St. Louis about the middle of June.

Brunswick & Albany.

It was expected that the location of the line would be completed by the engineer corps to Albany, Ga., on the 17th. The maximum grade thus far has been thirty feet to the mile, much lighter than was at first anticipated. As soon as the maps, profiles and estimates of this division can be made out, the contracts will be let. Fifty miles of the road, from Brunswick westward, were completed some weeks ago.

Dunkirk, Warren & Pittsburgh.

The Buffalo *Commercial Advertiser* says: "At a recent "meeting of the Directors, held in Fredonia, it was "unanimously voted to consolidate with the Pennsylvania portion of the road, and to make the capital "in Chautauqua county $1,000,000. The length of the "road in that county is 42 miles, and in Pennsylvania 12 "miles. The consolidated capital stock of $1,300,000 "represents $24,000 per mile, which will be about the "cost of the road, with buildings, switches and rolling "stock. On the 6th inst. the stockholders of the Pennsylvania end of the road met at Warren, and resolved to "consolidate with the New York portion. They fixed "their capital stock at $300,000. No fears may be entertained for the success of the road after it shall have "been built. Already roads are being projected to "connect it with extensive coal mines. It is expected "to have the road in running order before the close of "this year. The oil and coal interests along the line of "the road, and its connections in Pennsylvania, and the "iron manufacturing at Pittsburgh, will all contribute "to make it a great thoroughfare of travel to Chautauqua county and also to Buffalo."

St. Paul & Chicago.

Five hundred men are now at work on the line between St. Paul and Red Wing.

The Winona *Republican* learns that contracts for the construction of the lower end of the line have been let and probably before this time work has begun between Winneiska and Minnesota City.

Lincoln, Waterville & Junction City.

A correspondent of the Waterville, Kansas, *Telegraph* says of the route of this proposed road:

"There is a good route for a railroad from Waterville "to Junction City, passing up Coon creek, then down "the north branch of Fancy; thence up Walnut creek; "thence over a good prairie to Milford. Thence down "the Republican river to Junction City, to a connection "with the Union Pacific and the great Neosho Valley "Railroad. This road can be built from Waterville to "Junction City in 49 miles."

South Pacific of California.

Governor Haight says that the law passed by the California Legislature authorizing the people of San Francisco to vote $1,000,000 in aid of this road, and it is thought that the proposition will be defeated. It provides for a road running southward from San Francisco in the direction of San Diego.

Indiana, Bloomington & Western.

The formal opening of this road from Danville to Pekin was celebrated at Bloomington last Monday, on which occasion a gold watch was presented to Dr. H. Conkling, a director of the company residing in Bloomington, for his services in securing the location of the road.

Blue Ridge Railroad of South Carolina.

It is contended that the act of the Legislature authorizing a guaranty of the bonds of this railroad company by the State of South Carolina is unconstitutional, and an injunction is asked to restrain the Treasurer from issuing them.

Muscatine Western.

A preliminary line has been run between Muscatine and Council Bluffs, passing through the northern portion of the tier of counties directly west of Muscatine. The officers of the company are now waiting for "extra inducements" to cause the line to diverge so as to pass through the county seats.

Grand Rapids & Indiana.

A correspondent of the Detroit *Tribune* writes from Kalamazoo that George W. Cass, President of the Continental Improvement Company (which is building the Grand Rapids & Indiana Railroad), Thomas A. Scott, First Vice-President of the Pennsylvania Railroad Company, and Jesse L. Williams, Receiver of the Grand Rapids & Indiana Company, were in Kalamazoo a short time ago, and purchased grounds for the Grand Rapids & Indiana Railroad, sufficient for depots, engine houses, car and machine shops, lumber and stock yards. He writes that "Gen. Cass and Mr. Williams stated that there "would be no further delay in the prosecution of the "road; that on each end of the work, north and south, "every man was put at work that could be obtained; that "the section of road between here and Mendon would "be the last to be finished of any now under contract, "but that the cars would be making regular trips from

"Fort Wayne to Kalamazoo on the track before the 1st "of January next." He adds that an arrangement is nearly completed between this company and the Michigan Central for a union depot. The people of Kalamazoo talk of offering ground for a round house and shops, as an inducement for locating them there. As the proprietors of this road also own the Fort Wayne road, and have shops at Fort Wayne, they will need unusual inducements to make them build extensively elsewhere.

Cedar Rapids & Marengo.

At a convention held at Cedar Rapids on the 11th inst. a committee was appointed to report on the cost, terms of construction and extent of contributions in aid of a road from Cedar Rapids southwest about twenty-five miles to Marengo or some other point on the Rock Island road, giving in connection with the Dubuque Southwestern and the Rock Island a direct route from Dubuque to Des Moines and Council Bluffs.

La Clede & Fort Scott.

Mr. Burgess, of La Clede, has closed a contract for the construction of thirty miles of the road, from Lebanon, Mo., westward to Buffalo, Dallas county. Twenty miles of the grading, from Fort Scott westward, was put under contract last fall. This road, in connection with the South Pacific, of Missouri, will give Fort Scott and Southern Kansas their shortest outlet to St. Louis and the East.

The junction of this road with the South Pacific is fixed "within one-half mile of the Court House at Leba-"non," and as the location of the court house has for some time been a vexed question the operations of the railroad company have been delayed in consequence.

Rockford, Rock Island & St. Louis.

Sterling is discussing the proper way to secure the shops of this road for itself, and Rock Island and Moline are likely to make a bid for them.

Ottawa, Oswego & Fox River Valley.

Track has been laid for five or six miles north from Streator on the way to Ottawa, Ill., which latter place is to be reached by the middle of June.

Eastern Kentucky.

The Ironton (Ohio) *Journal* learns that a portion of this road, between Hunnewell Furnace and Grayson, has been let, and is to be completed for ties and rails by the first of January next. Also that the contracts will soon be let for a branch road to the famous Lambert ore banks, and another down Tygart to the Ohio river, near Portsmouth. This road forms a link in the line which will connect Louisville with the western terminus of the Chesapeake & Ohio Railroad, but it will be necessary to extend it fifteen or twenty miles eastward in order to complete the connection.

Burlington, Cedar Rapids & Minnesota.

The Cedar Rapids *Times* is our authority that the construction train on the Northern Division now runs some distance above Vinton, and the iron for the completion of the road to Waterloo is in readiness. The Commissioners to appraise damages for the right-of-way from Cedar Rapids to the northern line of Johnson county have finished their work. The contract for this portion of the work is let, and Burlington, Cedar Rapids, Vinton and Waterloo will be united by rail at an early day this summer.

Selma, Rome & Dalton.

An officer of the road writes to us that this road "will "be open for business June 1. Its equipments are first-"class and its track in good order. It is a link of 230 "miles in the great Southern all rail route from New "York to Mobile and New Orleans." The road has been open for some time between Selma and Rome, whence it reached the road between Chattanooga and Atlanta by the old Rome & Kingston Branch. The part to be completed is from Rome to Dalton which will complete a direct route to Knoxville.

Baraboo Air Line.

The St. Paul *Press* says: "The people of Baraboo, "Lodi and vicinity are making strong exertions and lib-"eral subscriptions of stock in aid of the Baraboo Air "Line Railroad. This is the road running through the "Baraboo and Lodi valleys directly northwest from "Madison, connecting the Northwestern at that place "with the Winona 'cut off' west of La Crosse, and af-"fording a direct continuation of the Chicago & St. Paul "Railroad on almost an air line to Chicago. The route "was surveyed several years ago by the Northwestern "Company, the right of way secured and considerable "work done in excavating."

Burlington & Missouri River.

On the Nebraska Division trains run regularly to South Bend, on the Missouri, eight miles below Ashland. In a few days the track will be complete to Ashland, twenty-five miles west of Plattsmouth, and then two trains daily will run over the road. The company has closed a contract with the citizens of Lincoln for the right of way and depot site. The citizens are to give $5,000 towards the right of way, and the company agrees to locate the depot permanently on the grounds sold for that purpose by the State Commissioners, west of Eighth and between O and Q streets.

Missouri River, Fort Scott & Gulf.

Colonel Chapman, the Chief Engineer, has been prospecting for a route through the Indian Territory and reports the ground favorable to light grades.

Indianapolis & Vincennes.

The Vincennes *Times* is informed that the above road is now owned by the Pennsylvania Central, and that in less than twenty days regular freight and passenger trains will be running. The transfer took effect two weeks ago.

Logansport, Crawfordsville & Southwestern.

A contract for building this road has been ratified by the directors, and finally sealed and delivered. The contract, as we announced a few weeks ago, binds the builders to commence the work by June 1, 1870, and finish it by August 1, 1870.

St. Louis, Chillicothe & Omaha.

The road from Brunswick, on the Kansas City Divi of the North Missouri, northwestward to Chillicothe, on the Hannibal & St. Joseph, thirty-four miles, is to be completed by the 4th of July. Between Chillicothe and Gallatin, twenty-three miles, work is progressing, and it is intended to complete this part of the line this year.

Mobile & Montgomery.

The letting heretofore advertised of the extension of the Mobile & Montgomery Railroad has been postponed from Wednesday, June 1, to Wednesday, June 15. Proposals will be received up to 10 a. m. on that day. Complete specifications have been ready since the 15th inst.

Denver, Central & Georgetown.

The preliminary survey of this road has been completed and the engineers report that no grade of more than eighty feet to the mile will be required. They will locate the lines immediately, and it is intended to commence grading soon.

Missisco Valley Railroad.

This road is to be built from a junction with the Grand Trunk at Brighton, in Northwestern Vermont, in a general northwesterly direction, twenty-seven miles, through the towns of Charleston, Salem and Derby, all in Orleans county, to a junction with the Passumpsic River Railroad at Clyde River, on the east side of Lake Memphramagog. Work has been commenced on the line, and it is intended to finish it this year.

Transferring Cars at St. Louis.

The St. Louis *Journal of Commerce*, discussing the policy of the St. Louis Common Council in refusing to grant the Missouri Pacific the right to lay a track to the river and thus connect with the North Missouri track, gives the following illustration of the difficulty of making transfers in St. Louis: "The distance along the levee "between the North Missouri Railroad track and the "foot of Poplar street, (where the Pacific Railroad de-"sired a connection with the river,) is about half a mile. "A few days ago, when the South Pacific Railroad en-"gaged sleeping cars for their Springfield excursion, "they found *the only connection between the two roads was* "*through Kansas City*—and the cars were actually taken "from the North Missouri depot to Kansas City, thence "over the Pacific Railroad to the Pacific depot! Let it "be understood then, that the present length of the actual "connection between the North Missouri and Pacific "railroad depots in St. Louis is 554 miles!"

St. Louis & Keokuk.

The newly elected President, Josiah Fogg, of St. Louis, is devoting himself to the work of pushing this road. Col. Miles Smith, late General Superintendent of the Des Moines Valley Railroad, has been appointed Chief Engineer. Commissioners are securing the right of way, and there is a prospect that the road will be built within a reasonable time.

St. Louis & Fort Scott.

It is proposed to build a railroad from the Missouri Pacific at or near Franklin, (the present junction of the South Pacific), in a direction south of west (45 miles south and 215 miles west) to Fort Scott, Kansas. Such a road would divide pretty equally the distance betweeen the Missouri Pacific and the South Pacific, with abundant territory on each side to support a railroad. But it would probably interfere somewhat with the plans of both the roads mentioned to reach Fort Scott by means of branches, both of which are actually in progress and will give St. Louis very direct connections with Fort Scott and at a fraction of the cost of the proposed St. Louis and Fort Scott road.

Boston, Hartford & Erie.

The Committee of Finance of the Massachusetts Legislature has reported emphatically against giving any further State aid to the above company. They say it is in a hopeless condition, the only way out of which is through bankruptcy. It was the Railroad Committee which reported in favor of a new grant.

New York & Harlem.

Cornelius Vanderbilt, the President of this company, made the following communication to the New York Stock Exchange on the 14th inst.:

"You will please take notice that the New York & Harlem Railroad Company will, on the 16th of June, 1870, issue twenty thousand (20,000) shares of common capital stock, in addition to the amount issued for the purpose of certain expenses for and incident to the construction of a new passenger depot at Forty-second street and Fourth avenue, in this city.

The New York *Express* says that it is the general belief on Wall street that this new issue of Harlem stock was sold some time ago.

ELECTIONS AND APPOINTMENTS.

—At a meeting of the Kentucky River Navigation Company at Frankfort, Ky., on the 9th inst., Moreau Brown was re-elected President, J. W. Batchelor, of Louisville, Secretary, and P. Swigert, Assistant Secretary and Treasurer.

—Capt. Sheble, late of the Peoria and St. Louis Packet Line, has accepted an appointment as General Freight Agent of the Rockford, Rock Island & St. Louis Railroad.

—The appointment of general managers of the Lake Shore & Michigan Southern Railway is announced—E. B. Phillips, with headquarters at Chicago, and J. H. Devereux, with headquarters in Cleveland.

—The Muskegon and Big Rapids Railroad Company has been organized with a subscribed capital of about $50,000. The following named gentlemen were elected Directors: Messrs. L. G. Mason, Alex. Rogers, R. F. Easton, W. F. Thompson and Chauncey Davis, of Muskegon, and Messrs. Geo. F. Stearns, John F. Brown, Jacob O. Rose, Col. Stewart Ives and Sumner Stickney, of Big Rapids. The following officers were chosen: President, Alex. Rogers, Muskegon; Vice-President, J. S. Stearns, Big Rapids; Secretary, Stewart Ives, Big Rapids; Treasurer, C. Davis, Muskegon; Executive Committee, Alexander Rogers, J. S. Stearns and W. F. Thompson; Attorney, Francis Smith, Muskegon.

—At the annual election of the American Bank Note Company, held May 4, 1870, the following gentlemen were elected Trustees for the ensuing year: John E. Gavit, Neziah Wright, J. Dorsey Bald, Albert G. Goodall, Tracy R. Edson, C. L. Van Zandt, Wm. M. Smillie, Geo. H. Stayner, Theo. H. Freeland. At a subsequent meeting of the Board of Trustees, the following officers were re-elected: John E. Gavit, President; C. L. Van Zandt and Albert Gavin, Vice-Presidents; Theo. H. Freeland, Secretary, and Neziah Wright, Treasurer.

—The Stockholders of the Sioux City & Columbus Railroad Company, on the 10th instant, elected the following Directors: S. T. Davis, John H. Charles, John Cleghorn, Jas. Stott, Wm. Adair, Wm. H. James, C. F Eckhart, each having 6,000 votes. At a subsequent meeting the directors elected the following officers: President, S. T. Davis; Vice President, Wm. Adair; Treasurer, John Cleghorn; Secretary, Jas. Stott. They adjourned to the second Tuesday in June, when it is expected some action will be taken towards the commencement of the work.

—The following Directors of the Lake Pepin & Omaha Railroad Company were elected on the 6th instant: A. T. Sharpe, Judge Van Dyke, Wabasha; A. T. James, Highland; N. F. Tefft, H. H. Butts, Plainview; Jos. Leatherman, Geo. Bryant, Elgin; J. A. Leonard, O. P. Whitcomb, Rochester; Thos. H. Armstrong, High Forest; O. H. Brown, Brownsdale; Solomon Snow and Ormanzo Allen, Austin. The old officers, who were re-elected, are as follows: Dr. N. S. Tefft, of Wabasha, President; Geo. Bryant, of Elgin, Vice President; H. P. Willson, of Plainview, Secretary; O. P. Whitcomb, of Rochester, Treasurer. The company intend securing the construction of a road from Austin to Wabasha, to connect either with the Green Bay road or with one to Lake Superior, by way of the Chippewa Valley. A preliminary survey of the entire line is to be made this season.

—J. D. Layng, Superintendent of the Erie & Pittsburgh Railroad, on the 2d inst. issued orders announcing the appointment of John M. Kimball, Assistant Superintendent, and George V. Mans as General Agent of the road, with headquarters at Erie, and John V. Fletcher Road Master, and S. M. Cummings, Master of Machinery, with headquarters at Pittsburgh. Mr. Kimball was for a time General Ticket Agent of the Fort Wayne road, and Mr. Cummings is Master of Machinery of its Eastern Division.

—John Taylor Johnson has been re-elected President of the Central Railroad Company of New Jersey, and Samuel Knox, Secretary and Treasurer. The directors are: John Taylor Johnson, James Boorman Johnson,

Sidney Dillon, Adam Norrie, John C. Green, F. T. Frelinghuysen, B. Williamson, Asa Packer, H. D. Maxwell.

—William H. Gatzmer, Benjamin Fish, Cambridge Livingston, Ashbel Welch, Charles MacAlister, and William G. Cook, have been elected Directors of the Camden & Amboy Railroad Company.

—On the 3d inst. the following persons were elected officers of the Oswego & Rome Railroad Company: Marcellus Massey, President; S. D. Hungerford, Vice-President; J. A. Lawyer, Treasurer; C. M. Moore, Secretary.

—H. A. Sessions has been appointed Master Car Builder of the Rome, Watertown & Ogdensburg Railroad. He is a son of M. M. Sessions, Master Car Builder of the Vermont Central, and, though only twenty-three years of age, is said to be a most capable mechanic.

—J. B. Simonson, of Holly, Mich., was elected President of the Holly, Wayne & Monroe Railroad Company for the ensuing year at a meeting of stockholders on the 18th inst.

PERSONAL.

—Mr. P. H. Burns, who for several years has held the champion's gold telegraph key for excellence and rapidity of transmission of telegraph messages by the Morse system, died of consumption at Fishkill, N. Y., on the 4th inst.

—It is reported that Thos. S. Ridgway, President of the Springfield & Illinois Southeastern Railway Company, is likely to be the Republican candidate for Congress from the district now represented by Hon. John M. Crebs.

MECHANICS AND ENGINEERING.

The East River Bridge.

Work upon the great caisson for the East River Bridge proceeds with rapidity. Since it was towed into port from Greenpoint, last week, three layers of yellow pine timbers have been laid upon it. They are thirteen inches in diameter and three inches apart. The interstices are filled with gravel and a cement that water serves only to harden. Seven more layers of these timbers are to be added, and the caisson will then be lowered to the bed of the dock, which has been dredged for the purpose to a depth of thirieen feet below low-water mark. The greater part of the bottom of the caisson is hollow, and when finally completed the earth will be dug out about twelve feet below it. Means will be taken to exclude the water, and the work will be accomplished by men who will descend into the cavity. Iron cylinders, three and a half feet in diameter, have been prepared for a manhole and for the admission of air. Other cylinders, six and a half feet in diameter, will be used for raising the earth from below. The caisson is now kept afloat by the constant pumping of air into the hollow beneath, which forces out the water. It is 108 feet long by 102 feet wide, and one hundred and twenty men are employed in completing it. It will be ready to sink soon after the 1st of June, and when a few inches under low-water mark the granite foundations of the tower will be laid upon it.

Boring has begun upon the New York side, at Pier 29, to prepare for another caisson, which will be laid next November.

Novel Cars.

The Mason Car Manufacturing Company is building for the New Haven, Hartford & Springfield Railroad four twelve-wheeled passenger cars, with iron trucks, which are said to cost $3,500 for each car. There will be seats for seventy-six passengers in each car.

Niagara Bridge at Buffalo.

A telegram from Buffalo says that the contract for building the railroad bridge across the Niagara river, between Buffalo and Fort Erie (chiefly for the use of the Grand Trunk Railway), has been let, and that it is to be completed in 1871. At the recent meeting of the Grand Trunk Company in London, the officers were authorized to make an expenditure of £20,000 upon the piers this year, which will make it possible to complete the bridge by 1872.

Iron Bridge Building.

Within the past twenty months F. C. Lamthrop of Trenton, N. J., has built one double-track pivot bridge, with two openings of of sixty feet in the clear each, for the New York & New Hoven Railroad Company; twenty-three double-track bridges, with spans varying from 54 to 162 feet; for the same company; one double-track trussed girder bridge 205 feet long for the New Jersey Central Railroad Company; one single-track bridge 129 feet long for the Glendon (Pa.) Iron Company; and two highway bridges.

The Rock Island Bridge.

Gen. G. K. Warren, of the United States Corps of Engineers, who has charge of the construction of the new government bridge between Rock Island and Davenport advertises for bids for building the iron superstructure, to be handed in by noon on July 6.

MISCELLANEOUS.

—A project is on foot in Gallatin, Tenn., to construct a cheap railroad from that city to the Cumberland, a distance of three miles, for the purpose of bringing coal and timber from the river. It is thought the road proposed can be built and equipped at a cost of $7,500 per mile.

—John W. Thompson, of Saratoga, President of the Ballston Spa Bank, and other holders of preferred stock of the Erie Railway, have sued for dividends for two years.

—From recent experiments on telegraphic lines, in some of the rocky and mountainous districts of Vermont, Mr. Moses G. Farmer found the resistance, for two or three miles, equal to the usual resistance on a line of *five hundred miles.*

—Illinois has now 6,000 miles of railroad (of which 5,000 are open for business), costing, with the equipment, $120,000,000.

—The Anglo-American Cable Company, in response to the petition of the Liverpool merchants, have promised to run a direct telegraph line from Liverpool to Valencia. Messages for America will not then be delayed by transmission first to London, as is the case at present.

—The Detroit & Milwaukee Railroad freight rates from Detroit to Grand Haven have been reduced about 25 per cent.

—The stockholders of the New York & New Haven Railroad Company will hold their annual meeting for the election of a new Board of Directors for the ensuing year, at New Haven, on Thursday 19th inst. From the report of the Directors to the stockholders, it appears that the earnings of the road during the past year have been $2,261,966.81, as follows: For transportation of passengers, $1,715,544.40; freights, $415,059.56; mails and express matter, $107,691.64; income from other sources, $23,671.21. In the same time the expenses for general superintendence, office expenses, salaries of agents, conductors, clerks, watchmen and switchmen, coal, wood, repairs of road, bridges, buildings, &c., have amounted to $1,042,659.46. Deducting $279,559.30, *viz:* $182,210.91 for taxes; $91,628.43 for interest, and $1,519.96 for loss sustained by operating the Canal Railroad from April 1 to July 1, leaves a net income of $769,300.16 for the year ending March 31. Two dividends of 5 per cent. each, amounting to $675,060, have been paid during the year; also $211,007 for materials required for the coming season, in addition to the payments made for taxes, interest, real estate, steel rails, new bridges, &c. The Superintendent reports that 2,464,259 passengers were transported over the road during the past year; and that during a period of 14 years last past, 21,035,346 passengers were transported over the New York & New Haven Railroad, without accident to any train, while on that road, which caused the loss of a single life or limb to any passenger so transported.

—It is reported that a through line of sleeping coaches between New York city and St. Louis to run *via* New York Central Railroad, Cleveland, Crestline, and Indianapolis, is to be established on the 1st of June.

—The New York Central Railroad has, among its other appointments for public convenience, a special car designed for the transportation of valuable horses. Its interior is divided into two box-stalls, fixed up with all the appointmentments necessary to complete equine luxury.

—Herr Pressel, the manager of the Turkish railways, left Vienna for Constantinople on the 16th ult., in order to proceed at once with the construction of the various lines for which concessions have been granted. The works have already been begun at three places on the line from Enos to Tartarbazardjik, *via* Adrianople, and Herr Pressel hopes to complete the line by the end of next year. The engineers and principal workmen are all Germans.

—The Boston & Albany Railroad has new repair shops at Allston, Mass., among which is a paint shop 200 feet by 65, with two tracks running through it and accommodating eight cars at a time.

—The Senate Pacific Railroad Committee has completed the bill for the construction of a railroad to the Pacific on the 22d parallel. It grants the usual amount of land to about forty corporators, from Eastern and Southern States, and ignores Fremont's El Paso party.

—The Managers of the Western Union Telegraph Company have inaugurated a system for the transmission of money from principal offices, in many respects like the post-office money-order system. A person wishing to make a quick payment to any other person in another place, has only to step into the telegraph office, deposit the amount of money he desires to pay, send a message to the payee that he has deposited a certain amount to his credit, naming the telegraph office at which it is payable, and almost before he leaves the office the payment will be made, though hundreds of miles separate the parties to the transaction. The office receiving the money authorizes the office from which it is to be paid, to pay the amount so deposited, and charge the amount against the office giving such authorization. The rate of commission is one per cent. Orders ranging among the thousands may be obtained, and the amounts are only governed by the ability of the offices to which they are sen to pay.

—One of the sections of the proposed new Constitution of Illinois provides that no law shall be passed by the General Assembly granting the right to construct or operate a street railroad within any city, town, or incorporated village, without the consent of the local authorities having the control of the street or highway proposed to be occupied by such street railroad.

THE FUTURE FREIGHT LOCOMOTIVE.

There is a general effort on the part of mechanical engineers to produce something new and novel in the designs for locomotives. The great want is a locomotive that shall utilize the whole, or nearly the whole, of its own weight for tractive purposes. Mr. Fairlie, with his double engine, carried on groups of connected wheels, proposes to utilize all the weight, including fuel and water; and on the single specimen built in this country, the whole weight, sixty tons, is carried on two groups of driving wheels, six in each group. This gives five tons on each wheel, and if the steaming capacity is commensurate with the weight on the wheels the engine must be of great value for heavy freight trains on the steep inclines of such roads as the Pennsylvania Central, and the Baltimore & Ohio, and some others. We have heard of an objection to this style of engines, that it is too powerful, that the present system of building cars will not allow the use of such powerful *drawing* machines, that the present methods of shackling will not hold the long and heavy train together, and that it is altogether better to use a pushing engine where the train is heavy, rather than to have the whole strain taken by the engine drawing the load. Whether this objection is valid or not, we leave it for car makers and master mechanics to settle; but it would seem an easy thing so to construct the car frames and car connections that they would bear the strain required; at any rate, if a sixty ton engine, with five tons on each wheel, is found objectionable, it is easy to reduce to four tons on each wheel, which is thought to be the safe limit for iron rails, or say forty-eight tons. There is another feature in this style of engine that is of great advantage:—Those groups of connected wheels are independent of each other, giving practically a very short wheel-base, and thus allow the engine to pass the sharpest curves with the greatest ease. Graduated in weight to meet the wants of the traffic or strength of the superstructure, such a style of engine must be very serviceable in freight traffic, unless there is some disability about it that we at present are not aware of. Several of these engines are at work with great success on foreign roads, if we may believe the reports made in the mechanical and engineering journals of Great Britain. We intend hereafter to print a full detailed description of this engine, and thus enable our mechanical readers to judge of its applicability for heavy work on steep grades and sharp curves. Several modifications of the freight locomotive have been made in this country within a year or two, the particulars of which are referred more particularly in the *Railway Times* of January 15th last, in describing the favorite engines at work upon the Lehigh Valley Railway. The particular engines referred to is the six-wheel connected, carrying thirty-one tons, with the pony truck carrying but about five tons. The forward truck has Mr. Bissell's device for giving flexibility in the wheel-base, in fact rendering it as serviceable in that respect as Mr. Fairlie's device. Another engine of the same class, but differing in the distribution of weight upon the wheels, and in some other details, was described in detail in the *Railway Times* of February 5th. This engine is running upon the New York Central, and was built by Mr. C. T. Ham, the Locomotive Superintendent of that line. It has three pair of driving wheels connected, and the forward truck only carries 10,700 lbs., while the weight on the drivers is some 65,000 lbs. It has the same flexible characted as noted in the Lehigh Valley engine built by Mr. Mitchell, and its hauling capacity, and the ease with which it passes through the sharpest curves, attract a great deal of admiration from every engineer who has seen it at work. We have too long been in the habit of building engines of great weight, a large disproportion of which has been dead weight, or useless for tractive purposes, and with a long rigid wheel base, which is very destructive to any track having curves of even a moderate radius. The three instances noted above show an improved practice, and lead us to hope that even other improvements may be made tending to practical economy and greater efficiency. In extending the railway system, especially in branch lines through a rough country exceptional grades and curves become admissible from the fact that the modern built locomotive embraces improvements over those used at an earlier day. Plenty of steam power, the weight used for traction, a wheel base long enough to give steadiness, and a flexibility enabling it to pass sharp curves without disturbing the rails, seem to be the requisites of a successful engine. The same general features are, however, just as valuable on all lines as they are on those with exceptional curves and grades. What is wanted is to get rid of all friction, that cannot be utilized for power. A great deal of power is uselessly wasted in locomotives, tenders and cars, because of their want of a flexibility that will allow the running gear to accommodate itself to deviation from a straight line in the track. A rigid, extended wheel base in the rolling stock is the cause of a vast amount of useless expense in railway operations.—*American Railway Times.*

RAILROAD GAZETTE

PUBLISHED EVERY SATURDAY.

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Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

☞ *Our Prospectus and Business Notices will be found on the last page.*

WARMING AND VENTILATION OF RAILROAD CARS.

We suppose nearly every one who was interested in reading our editorial on this subject published in the GAZETTE of April 23, has also read the communication of "E. T." in the number of May 7. Our article was written, not in support of any special theory or plan of ventilation, but to call attention to its importance and as far as may be to the principles and conditions which must be observed in order to ventilate a car thoroughly. We have read the communication of "E. T." carefully, in order to discover the points, if any, wherein we differed.

As to the importance of supplying fresh air to the occupants of railroad cars, we presume there can be no difference of opinion in the minds of people who have had any experience, or have reflected on the subject. In considering it, however, it must constantly be borne in mind that the great majority of people who travel have perhaps never given the matter a thought, or, at any rate, do not realize its importance; and most of them seem to be conscious of but two sensations in relation to the atmosphere in which they live and move and have their being, viz: heat and cold; and, as "E. T." very truly says, "of the two alternatives, passengers prefer warmth and foul air to air which is cold." Whenever the fresh air which is supplied to a car causes a sensation of cold to the passengers, it will be disagreeable to the majority of them, and they will object to its introduction and close the aperture through which it enters. It does not matter at what point the air is admitted, *if it is cold*:—if at the roof, it will fall to the floor just as certainly as the hot air will rise; if it comes in at the floor, it will produce a cold current about the feet of passengers; if half way up, it will come in contact with their heads and shoulders. Therefore in order to ventilate a car in cold weather with comfort to passengers, and without incurring their opposition it *must* be by introducing *warmed* and *not* cold air. It should be remembered too that a current of air sufficient to change 3,072 cubic feet every eight minutes is not so gentle as that required to ventilate an ordinary room occupied by only four or five people, who do not need more than about 224 to 250 cubic feet in the same time.

"E. T." says: "Give us the ever present *radiators* at our feet, so that we may be sure of warmth enough, warmth at all times and warmth when it is wanted, and warmth of the right quality. Give us the top of the cars open, both sides as much so as the structures will admit without unroofing the car, so that the fresh, out of door air may circulate freely in the region of the head, and we opine there can be nothing better." He draws a graphic picture, too, of the happiness which would be enjoyed by the occupants of a railroad car with the roof removed, if only "a perpetual radiator or foot-warmer is furnished each passenger." We have great confidence in the capacity of mankind for being "jolly" under unfavorable circumstances; but we certainly think the ability in that way of the passengers referred to would be sorely tried if the thermometer were below zero, notwithstanding the fact that "a perpetual foot-warmer is furnished them."

How long does "E. T." think, or has he found by experience, "both sides" of a car are left open under the circumstances we have described? Our observation has been that as soon as a cold draft is felt by nervous females of ages not mentionable, or asthamatic, elderly gentlemen, or Philistines with oily hair and dyed whiskers and flashy jewelry, that each and every one of them will "go for" the ventilators, or any other aperture which admits *cold* air.

That steam and hot water radiators are "the only practicable system for warming a car," we do not feel called upon to deny, but think, for the reasons we have given, the fresh air should be warmed by whatever appliances are used for heating *before* it enters the car, and not *after*. If, as "E. T." says, "it is not possible—or at least not practicable—to warm a car by the introduction of fresh air," then there is little more to be said; but, alas! very much bad air is to be endured. But, as the lawyers say, that is the "leading question," and we again put it to the car-builders and master mechanics:—can't some *practicable* means of warming a car by the introduction of fresh warmed air be devised? The difficulties of doing this have been very well stated by "E. T., but they do not demonstrate that it is impossible. We must also disagree from him in his statement that "the attempts" on the Chicago, Burlington & Quincy and Michigan Central railroads in heating their cars by the introduction of fresh warmed air "have been productive of little else than failure," if by failure he means that the system (Ruttan's) which is in use on those roads will not both warm and ventilate a car thoroughly. That the arrangements in use there require more care and attention than they always receive, or than would be given them on roads which are not so well managed as the Chicago, Burlington & Quincy and Michigan Central, we are ready to grant, and therefore the necessity of greater simplicity in the appliances to be used.

Of the precise manner in which the air can best be warmed and supplied to the car, we are not now prepared to speak, although we have ideas on the subject which we may "ventilate" in future. Meanwhile, any persons who have in successful use any arrangement for both warming and ventilating cars, would oblige us by sending a description, with drawings, if practicable.

THE PROPOSED CHICAGO & NORTHERN RAILROAD.

The Chicago *Republican* devotes nearly two columns to a description and discussion of this project, which has been proposed, abandoned, revived, forgotten, and re-revived. The route is from the east side of the North Branch of the Chicago river to the city limits, north by west about ten miles, where it crosses and pursues a more northwesterly course to a crossing of the Des Plaines at Wheeling; up the west bank of the Des Plaines to Libertyville, Lake county; thence northwest by Grey, Round, Long, and Fox lakes, crossing the Fox River of Illinois near the mouth of the Nippersink; up the valley of the latter stream through the villages of Solon and Richmond, McHenry county, to Genoa, Wisconsin, close to the State line and the junction of the Kenosha Division of the Fox River Valley Branch of the Chicago & Northwestern. Thence it would pass through Geneva, Elkhorn and Whitewater, in Walworth county, to Jefferson, in Jefferson county, on the line of the Wisconsin Division of the Northwestern. From that place, or a point near it, it is proposed to build two lines, one nearly due northwest through Sun Prairie, Dane county, and Baraboo, Sauk county, to Tomah, the junction of the Milwaukee & St. Paul and the West Wisconsin, in connection with which latter road it would make a very direct route between Chicago and St. Paul. The other branch would extend from Jefferson in a direction about half way between northwest and north through Lake Mills, Waterloo, (on Madison line of Milwaukee & St. Paul), Columbus, (on La Crosse Division of Milwaukee & St. Paul), Cambria, (on Northern Division of Milwaukee & St. Paul), to Montello, on Fox River, the county seat of Marquette county, and in the same general direction through the wild and uninhabited country of northern Wisconsin to Bayfield, on Lake Superior, about sixty miles east of the west end of Lake Superior.

The line from Chicago to Tomah is through a rich country, but it has the Chicago & Northwestern not more than twelve miles from it nearly the whole distance this side of Jefferson, and between that point and Tomah it would be quite as near the LaCrosse line of the Milwaukee & St. Paul.

The latter company might find the line between Columbus or Cambria and Chicago useful as a route to Chicago for business that will not go to Milwaukee, or will go further east by rail. It would render it to a great extent independent of the Chicago & Northwestern. But for its purposes a line further east would seem more advantageous. Its value as an independent line between Chicago and St. Paul would be somewhat modified by the fact that the line from Tomah to St. Paul is operated by the Milwaukee and St. Paul Company, and unless it should own the proposed road also, it would hardly permit the diversion of traffic from its line at Tomah, when it might carry it 150 miles farther, to Milwaukee. It would be much more advantageous for it to give it to the Chicago & Northwestern at Milwaukee, or even at Watertown.

As for the other division and the traffic which the *Republican* thinks it will bring from the Northern Pacific, there is not much to say. Whatever business the Northern Pacific gets is almost sure to pass through Chicago on its way to the East if it goes by rail, whether any new roads are built or not. The proposed road would not help us any; but unless Northern Wisconsin has been wofully slandered and unaccountably neglected by immigrants, it could hardly hope to make its operating expenses, to say nothing of dividends. Moreover, if the Northern Pacific divides the business which the Union Pacific now gets, and the heavier freights move eastward by lake (as they are sure to do), neither Chicago or a new railroad will be made rich by that share of the traffic which comes here. Still, when the country on the Northern Pacific is settled, it will be likely to have a heavy business, which will help to build up a great city at the west end of Lake Superior, but a share of which will also come to Chicago. When that time comes it will be well to have roads enough to carry the traffic, even if we have to build a new one.

THE KANSAS CITY, ST. JOSEPH & OMAHA RAILROAD.

This is a new name among railroads—nothing very strange in these days, to be sure—but in this case the name applies to a *bona fide* railroad already in operation, with a large and constantly increasing traffic. For the new name is applied to two old roads which have recently been consolidated—the St. Joseph & Council Bluffs and the Missouri Valley roads. The first named road extends up the east side of the Missouri river, very near its bank, from St. Joseph to Council Bluffs, a distance of 133 miles. It was owned chiefly by the New England capitalists who control the Hannibal & St. Joseph and the other "Joy" roads. It forms a link in a line to St. Louis over which through cars are run. The Missouri Valley Railroad extends from Kansas City up the east side of the Missouri to St. Joseph, 69 miles, and thence diverges from the river, and extends nearly due north 61 miles further to a station near the Iowa line called Norway. Thus the total length of the road is 130 miles. The section below St. Joseph, in connection with the St. Joseph & Council Bluffs road, forms a direct river line from Kansas City to a point opposite Omaha (three miles from Council Bluffs station) 202 miles in length. This is now the trunk line of the Kansas City, St. Joseph & Omaha Railroad, while the line from St. Joseph to the Iowa line forms a branch. As the business of the country through which this branch runs, seeks a market eastward rather than westward or southward, the branch might seem to be unfavorably located. But this fault, if fault it is, will be remedied when the road is extended, as is designed. This proposed extension is from the present northern terminus northeastward to a junction with the Burlington and Missouri River Railroad at or near Creston, which is the eastern terminus of the western division of that road. Its length would be about forty miles, making the whole length of this branch from St. Joseph about 100 miles. When completed, this line, in its operations, probably must seem to be rather a branch of the Burlington & Missouri River Railroad than of the Kansas City, St. Joseph & Omaha. It would give it a connection with St. Joseph, Leavenworth and Kansas City, useful, doubtless, chiefly for its local business, as the "Joy roads" have connection already with these places over the Hannibal & St. Joseph Railroad. But it would be especially valuable to it and its connections eastward on account of its local business, which in a line 100 miles in length through an exceedingly fertile country, where it would have no competition for the traffic, must be large and profitable. The distance from Chicago by this route would be: to St. Joseph, 497 miles;

to Leavenworth, 542 miles; to Kansas City, 566 miles. By way of Quincy and the Hannibal & St. Joseph these distances are: to St. Joseph, 469 miles; Leavenworth, 514 miles; Kansas City, 488 miles.

One advantage of the consolidation will be the securing of an outlet to the Hannibal & St. Joseph Railroad at Leavenworth. This can be made either by running down the river forty-five miles from St. Joseph to East Leavenworth, or by running up the river twenty-two miles from Harlem (opposite Kansas City) to the same place. By the former route the distance from Chicago is 514 miles; by the latter, 510 miles.

The importance of the newly consolidated road must increase when the Missouri River, Fort Scott & Gulf and the Leavenworth, Lawrence & Galveston roads are extended across the Indian Territory. In connection with them it will give an unbroken rail route under one general management from Omaha south to Red River, a route not likely to have much travel for some time, but which may have a heavy freight business, especially in cattle; for the trans-Missouri country is to become the great cattle-growing region of the country, and it will be supplied with stock to a great extent from the herds bred in Texas.

Springfield & Illinois Southeastern.

From Mr. Beecher, the Vice-President, we learn that the road will be completed to a connection with the Illinois Central at Edgewood by the end of this month, the southern terminus of the completed portion being at Fairfield, Wayne county. Work is resumed at north of Shawneetown and iron will be received there and put down immediately so as to complete the line between the Illinois river and Edgewood. As soon as the connection at Edgewood is made, cars can be run through from Chicago or St. Louis to a section of Southeastern Illinois hitherto trading chiefly with Evansville, Louisville & Cincinnati.

Mr. Beecher informs us that the company is giving its attention to the extension from Springfield to Beardstown and is likely get this well under way before it commences the section between Pana & Edgewood, which is the only part of the line on which work has not been commenced. Considerable freight may be expected from the road as soon as it is opened to Edgewood, and it is probable our chief supply of early peaches this year will come from this new road, as the crop on its line is very promising, while on the Illinois Central peaches were nearly all killed by a late frost.

Mr. Latrobe on Engineering.

We give in this number of the RAILROAD GAZETTE the last section of Mr. Latrobe's lecture on engineering. These lectures were originally prepared for and delivered before the Peabody Institute of Baltimore. They have given in a popular form, easily comprehensible and of unusual interest, a summary of the science and art of civil engineering, and especially of railroad engineering, such as every railroad man of whatever department ought to know. Of course they were not prepared for engineers, yet their careful historical development of the art makes them of great interest even to those who are proficient in the profession. Mr. Latrobe has promised at some future time to prepare for the RAILROAD GAZETTE some additional matter concerning the locomotive engine—a subject of transcendent interest and importance. Our readers will expect such a discussion from his pen with great interest.

REGISTER OF EARNINGS.

FOR THE MONTH OF APRIL.

Ohio & Mississippi, (340 miles) 1870		$370,933 73
" " (340 miles) 1869		214,409 52
Increase (26½ per cent.)		$56,524 20
Pacific of Missouri, (355 miles) 1870		$389,550 23
" " (355 miles) 1869		278,246 79
Increase (4 per cent.)		$11,303 44

FOR THE FIRST WEEK IN MAY.

Michigan Central, (494 miles) 1870		$79,979 68
" " (339 miles) 1869		75,567 59
Increase (5¾ per cent.)		$4,412 09
Chicago & Northwestern, (1,157 miles) 1869		$257,773
" " (1,157 miles) 1870		252,973
Decrease (2 per cent.)		$4,800
Milwaukee & St. Paul, (936 miles) 1870		$140,800
" " (835 miles) 1869		110,790
Increase (27 per cent.)		$30,010
Chicago, Rock Island & Pacific (520 miles) 1869		$105,151
" " (608 miles) 1870		100,400
Decrease (4½ per cent.)		$4,751
Cleveland & Pittsburgh, (203 miles) 1870		$49,711 23
" " (203 miles) 1869		41,397 91
Increase (20¾ per cent)		$8,313 32

FOR THE SECOND WEEK OF MAY.

Chicago & Alton, (465 miles) 1870		$89,451 15
" " (431 miles) 1869		84,207 96
Increase (6¼ per cent.)		$5,243 19

A CARD.

To the Subscribers and Patrons of the Railroad and Travelers' Journal:

After a few months of hard, earnest labor, and the expenditure of all the means at our command, the publishers of the above *Journal*, at great sacrifice of personal pride and feelings, were compelled to suspend its publication. Had they possessed a more thorough knowledge of what they were undertaking—of the long, laborious and EXPENSIVE battle for a competent co-operation and support, doubtless the paper had never seen the light. Only those who do know something of the trials and cost of establishing such a journal will appreciate the situation.

During the interval since the issue of the last number, the undersigned has endeavored to consummate arrangements for a revival of the paper; but, finally, as a more prudent measure, and one certain, ultimately, to prove more satisfactory to all concerned, has concluded to immerge it into the RAILROAD GAZETTE, an established, prosperous journal, concerning the character and standing of which nothing need be said here. It is well known everywhere.

Advertising contracts with the *Journal* will be completed by the GAZETTE, and subscribers to the *Journal* will be furnished the GAZETTE for the unexpired time of their subscriptions. Those already subscribers to the GAZETTE will have the time due them from the *Journal* added to their term of subscription. Thus, both realize an advantage: Advertisers getting the benefit of the aggregate circulation of both papers, and subscribers receiving a superior and much larger publication.

To personal friends, and other patrons, whose kind sympathy and earnest support deepened the regret of our unavoidable suspension, I hereby return most sincere thanks, hoping that it may please them to give the same cordial co-operation to the GAZETTE.

Any communications for me may be addressed to care RAILROAD GAZETTE, No. 101 Washington street.

LOUIS M. BABCOCK,
Late Editor Railroad and Travelers' Journal, Philadelphia.
CHICAGO, May 20th, 1870.

NEW PUBLICATIONS.

A Treatise on the Richards' Steam Engine Indicator; D. Van Nostrand Publisher. New York.

This book recalls Mr. Lincoln's celebrated story of the sinners who were too good to be damned and too bad to be saved, in that it seems to belong to the class of books which contain too much that is good to be condemned and too little that is new to be commended. It would be difficult, we think, for anyone without any knowledge of steam engine indicators to get a clear idea either of the construction of the Richards' indicator, or in fact any other, from the "treatise" before us. If the book is intended for the instruction of those who have no knowledge of indicators, it is entirely inadequate for its purpose; if, on the other hand, its object is to impart special knowledge to experts, then there is much that is superfluous.

The illustrations of the indicator could certainly give no very definite idea of its construction or principles to anyone unacquainted with either. A longitudinal section with a description, each occupying no more than a page, would give a clearer idea of the instrument than is now contained in the whole book; and a simple cut showing the application and the arrangements for giving it motion on a stationary or locomotive engine would be of more value to a practical engineer than three-fourths of the book is now.

The scope which is attempted could only be properly treated by a full investigation into the principles of valves and valve gearing, and in fact the steam engine itself. The text, too, is often so indefinite as to be unintelligible to many readers. What idea, for example, would be conveyed to a novice, by the following sentence: "The pencil is attached to a small piston, moving without friction in a cylinder, and the motion of which is resisted by a spring of known elastic force"? After reading it—if one did not know otherwise—it would be doubtful from the language whether it is the motion of the cylinder, the piston, or the pencil, that is resisted by the spring.

The book has value, however, in that it calls attention to the indicator as a means of becoming acquainted with the condition and operation of steam engines. The use of it on locomotives in this country is almost unknown; and doubtless a little intelligent experiment with it might often lead to a material reduction of the formidable fuel accounts of some of our railroads.

—The House Committee on Commerce has agreed upon the following appropriations for Western rivers: Ohio, Mississippi, Missouri and Arkansas, $140,000; Falls of the Ohio, $250,000; Illinois, $100,000; Rock Island Rapids, $150,000; Des Moines Rapids, $400,000; Cleveland, $29,000; Toledo, Maumee Bay, $50,000. The committee will not have a chance to report for several weeks.

—The Martin county (Indiana) *Herald* says: "Five progressive and intelligent ladies of Alfordsville donated twenty-five dollars each to assist in the construction of the Rockport Railroad."

Chicago Railroad News.

A Magnificent Train.

Last Thursday, at noon, a train of the Pullman Palace Car Company's cars left this city for Boston, where it is to receive a party of eminent residents of that city and vicinity for transportation to the Pacific coast and back, on a pleasure excursion—a little picnic you know, from the Atlantic to the Pacific,—from Faneuil Hall to the Golden Gate and the Yo Semite Valley. This excursion, be it understood, is made for pleasure, a journey of 7,000 miles or thereabouts made for the fun of the thing! and in summer, too!! and by rail!!!

Well, such things have become so common of late that we have almost ceased to notice, not to say to wonder, at them. This one strikes our attention because it extends from the farthest East to the farthest West, and also because the train in which it is to be made is remarkable for the number and character of its cars.

These are eight in number, the St. Charles, the St. Cloud, the Marquette, the Palmyra, the Revere, and the Arlington most of them entirely new. Of these the St. Charles and St. Cloud are commissary cars, each with seats at table for twenty-two and berths for twenty, an elegant and convenient kitchen, wine closet, etc. The Palmyra and Marquette are drawing-room cars worthy of this name, with rich sofas, curtains and carpets, an elegant cabinet organ, writing-desk and book-case. The Revere and Arlington are hotel cars, much like the commissary cars, with kitchen, cooking range, china closets, dining-rooms, and some sleeping berths. Besides these is the baggage-car, which is handsomely finished, and has half its space divided into closets for storing provisions, ice, etc., and the smoking car. The latter is decidedly a novelty, not only in its comfort and elegance, but in some of its accommodations. Among these is a veritable barber's saloon, with hair-dressers in attendance. In one end of the car is a neat little printing office, from which a journal, called the *Transcontinental*, with contributions from the excursionists, and genuine dispatches from the Associated Press, is to be issued daily during the trip. Only a bath room is needed to make this car complete.

The train is one of four to be run on the Union Pacific line by the Pullman Palace Car Company, the cars being similar in all respects to those described.

The Palmyra and Marquette were built at Hannibal, Mo.; Revere and Arlington at Aurora; St. Cloud and St. Charles at the Northwestern Works, in this city, and the smoking and baggage cars in Detroit.

The total cost of the train was about $175,000.

All the cars are supplied with Miller's platform coupler and buffer, Ruttan's ventilating apparatus, and some with Baker's hot water heaters. All are supported on Hebbard car springs.

Altogether, it is probably the finest and most completely appointed train ever seen, and all travelers may make long trips with all the comforts (barring sea-sickness) attainable on first-class steamers.

Chicago & Northwestern.

A new suburban train will be placed on the line, next Monday, running between this city and Turner Junction. Its time-table is not yet announced as we go to press.

Several changes in time on the Galena and Iowa Divisons will probably take place on the 29th in order to harmonize with the new time-table of the Union Pacific which goes into effect on that day.

A very handsome uniform has been designed for the passenger conductors. It consists of blue cloth sack coat, vest and pants, with a cap of the same material, of the navy pattern, with a gold band in front. The brass buttons, furnished by the company, have the company's monogram in the centre, with the word "conductor" on the margin.

The passenger brakemen are also to wear a uniform grey blouse, which will give them very much the appearance of a "Johnny."

Illinois Central.

Several changes in the time-table are announced to take effect to-morrow. The day St. Louis Express, the Cairo Mail, and the Keokuk Passenger will all leave here at 9:30 a. m., instead of 8:30, as formerly. The Fast (St. Louis) Line, the Cairo Express and the Keokuk Night Passenger will leave at 8:30 p. m., one hour earlier than heretofore. The Champaign Passenger will leave at 4:45 p. m. instead of 4:50. The 8:05 a. m. Hyde Park train will hereafter leave at 8:00, and arrive at 9:15 instead of 9:13. The 1:40 p. m. Hyde Park train will hereafter arrive at 1:50 p. m.

Chicago, Burlington & Quincy.

An excursion party left by way of this road for the Pacific coast last Wednesday.

Mr. E. A. Parker, General Passenger Agent, has opened a new office opposite the Sherman House, 63 Clark street, which will be his headquaters and also a ticket office for the accommodation of the patrons of the road.

Personal.

—Geo. L. Dunlap, Hugh L. Riddle and C. E. Perkins, superintendents of the Chicago & Northwestern, Chicago, Rock Island & Pacific and Burlington & Missouri River roads, respectively, met Col. Hammond at Omaha last Wednesday, to arrange new time-tables.

—The Boston and Providence Railroad Company by the verdict of a jury is to pay $400 damages to a woman who was injured at the West Roxbury depot one night, because it was not lighted.

THE MANAGEMENT OF RAILWAYS.

From the proceedings of the Illinois Constitutional Convention, now in session, it would appear, that the subject of railroad management is beginning to receive in the West the attention it deserves. The temptations to fraud on the part of railway directors are now enormous, and the checks upon them are trifling. For instance, a secret compact is made between the boards of two competing or connecting roads, by which one is sold or leased to the other at an enormous price, the directors and their friends at once buy up the one stock, and perhaps sell immensely of the other, and then publish the contract which changes the value of the stocks, and close their speculations in the market with large profits. Or, a secret arrangement is made for an unusual stock dividend out of profits which have been carefully concealed from the public, and even denied on oath by the officers of the road, and the stock bought at low prices by the "ring" is, after the dividend, sold at a vast advance to the public. In many such instances the value of their own property has been depressed by the secret compacts of the directors who hold it in trust, or immense issues of new shares have been privately sold to an unsuspecting public; and when the exposure was made, the stock has suddenly fallen, and the conspirators, by their breach of trust, have enriched themselves with the spoils of those they pretended to represent. These are but a few of the more conspicuous instances within a few years of the practice among directors of speculation in their own stock upon secret information obtained or secret acts performed in their official capacity, which affect its value. Hence the position of director in a railroad company is now too frequently sought and obtained at a large cost, with the evident, if not avowed purpose of profiting by the office in the stock company.

It is not necessary to discuss the morality of such conduct. In every form, and under every disguise, it is fraud. However "respectable" the names which may be cited as engaged in it, however customary it may be, however true the plea that many or most of those who suffer by it are themselves engaged in similar conspiracies, and that it is but an equal game of "cut-throat" between gamblers, it is nevertheless a public scandal, a disgrace to the community, a serious injury to our national credit and character throughout the world, and a powerful agent to corrupt the morals of the country. But the question is, how shall it be stopped?

The one condition of success in such intrigues is secrecy. Secure to the public at large the opportunity of knowing all that a director can know of the value and prospects of his own stock, and the occupation of the "speculative director" is gone. There will be some difficulty in effecting this in detail, but it can be substantially done with great simplicity. Let it be made the duty of the officers of every railway company to publish all its financial statistics, in a clear, intelligible form, as soon as they can reasonably make them up. The full balance sheet of the road, showing the sources and the amount of its revenue, the disposition made of every dollar, the earnings of its property, the expenses of working, of supplies, of new constructions, and of repairs, the amount and form of its debt, and the disposition made of all its funds, ought to be made up and published every quarter. A statement of the earnings for each month should be published, as complete as it can be made, on or before the 10th of the succeeding month.

These provisions, duly enforced, would put an end to one branch of the great wrong. But there is another change necessary in order that the powers of the management over the organization, stock and property of each company be properly limited. Contracts for the sale, lease, or consolidation of railways ought not to be within the power of directors. Many of these contracts are precisely parallel, in practice, to the conduct of an administrator or trustee, who should assign an estate in his hands in gross, at a nominal price below its value, and put the difference in his own pocket; an act which no court and no community in Christendom would be found base enough to tolerate. This subject, as we stated above, has attracted much attention in Illinois, where the State Constitutional Convention, now in session, has a committee at work devising guarantees against railway frauds; and it is understood that this committee is in harmony with the public sentiment in general in believing that only by positively forbidding every form of railway sale or consolidation by the companies can this kind of swindling be prevented.

But neither the publication of official statements nor the restrictions of official power could alone work a permanent reform. It is absolutely necessary that a fundamental change be made in the institution of corporations, which has led to such abuses. These are but specimens of the kind of change that is needed. The principle on which they rest is a broad and universal one; the essence of conspiracy! is secrecy, the condition of the abuse of power in the absence of responsibility. At present our railroad directors are secret in their whole official procedure, and there is no direct accountability for their conduct. Substitute entire publicity for secrecy, and make every member of such a property directly responsible for his fulfilment of the trust, and the last of the evil will be removed. It is this principle on which all legislation for the purpose must be framed.

Let every board of directors be required to keep the books and accounts of the railroad always open for inspection by the stockholders; to hold its meetings to discuss questions of management, and to receive reports of its officers with open doors. This would involve some inconveniences, but they are trifling compared with the wrongs it would prevent. Then let a principle of voting be adopted at the election of directors which will secure representation in the board to any sufficiently large minority of stockholders who may demand it; so that it shall no longer be in the power of one or a few men, by obtaining a temporary control of a bare majority of the stock, to name the entire direction. These measures secure absolute publicity for the affairs of the corporation which are of public interest; and a sort of responsibility to owners of the property by its trustees.

But it must be admitted that the responsibility of boards to annual meetings of a shifting body of stockholders is imperfect, and that individual rights are still in danger of being sacrificed to combinations. To prevent this, the plan adopted by the Massachusetts Legislature, and now advocated with great force in the Illinois Constitutional Convention, seems to be the best. It consists of a State Department of railways, with general power to supervise the action of the boards of directors, and to restrain them from fraud of every kind; to investigate the complaints of any person who may deem themselves wronged; and, in case of necessity, even to depose the directors, and give the property back to its owners, the stockholders, calling them together for the purpose. That such a department may be desired, and made extremely useful, is proved by the service it has already done in Massachusetts; as well as by the acknowledged benefits which the cause of life insurance has received from State supervision, conducted on quite similar principles.

In these general suggestions, we believe, will be found the elements of a solution for the great public question how our railroads shall be saved from becoming ruinous to the financial morality of the country, and this question is but one of many scarcely less important, which must be solved or abandoned with it. For the whole material progress of the nation is so bound up with its commercial morals that these cannot be impaired without injuring it. Any measures which secure honest management of railroads, and protect the public from the frauds of speculators in their direction, will improve the credit of our people, invite foreign capital into our improvements, promote the growth of our railway system, and thus, in a great variety of ways, contribute to the lasting well-being of the nation.—*Commercial and Financial Chronicle.*

THE NEW PASSENGER DEPOT OF THE HARLEM RAILROAD.

The specifications for the iron work to be used in the erection of the car house for the Union Passenger Depot to be built by the New York & Harlem Railroad Company, between Forty-second and Forty-fifth streets, Fourth avenue, and the new street west of the latter, in accordance with the drawings made by Mr. I. C. Buckhout, Civil Engineer of the company, were issued in this city on the 11th of March. The plans and drawings were photographed and sent to Europe, with a view of obtaining estimates; but the trans-Atlantic iron-workers wanted too much money for the work. The plans were then submitted to American architects in iron, and on Saturday the Architectural Iron Works, foot of Fourteenth street, in this city, received the contract at a sum said to approximate $1,000,000.

The foundation of this immense structure, to be the largest of the kind on this continent, is well under way—in fact, nearly completed. The contract calls for the completion of the entire structure within eight months from its date. If not completed within the time specified, the contractor is to forfeit and have deducted from the contract price $500 a day for every day over; and if completed within the time specified, the contractor is to receive, in addition to the contract price, the sum of $200 for each day the work is so completed and accepted by the engineer.

It is impossible to give a description which will adequately convey an idea of the magnitude of this building. The weight of iron to be used will be be over 8,000,000 pounds. It will require 100,000 square feet of glass in the roof alone, and 90,000 square feet of galvanized corrugated iron to cover the roof. The roof over the car house will extend over an area limited south and west by the office buildings, east by Fourth avenue, and north by a line 30 feet 6 inches south of Forty-fifth street. The entire length of the roof will be 652 feet, and it will be 199 feet 2 inches in width between the walls, and supported by 32 arched trusses, placed 20 feet 4 inches apart. These great arches will be set upon the foundation, whose upper surface is 2 feet below the surface of the ground, rising to an elevation of 94 feet from the springing line of the extrados of the arch.

The car house is to be lighted through three skylights extending over the entire length of the roof—one on the centre, double pitched, and two single ones on each side of the centre. There will be seven courses of ventilators running the entire length of the roof, faced up with stationary sheet-iron slats. On the south end, the segmental portion of the arch above the brick wall will be faced with cast iron trimmings and plate glass.

The north end will be closed with a beautiful cast iron front, highly ornamented. The east side, along the Fourth avenue, will be finished with cast iron pilasters acting as casings set in front of each truss. These pilasters are to have bases and caps, supporting a main cornice along to the front, and crowned by a cast iron balustrade; a line of balconies will run along the west side and across the south end, connecting with the offices in the second story. The trusses are placed in heavy cast iron shoes, 64 in number. To permit free expansion and contraction of the trusses, without interference with the side walls crossed by them, there will be placed cast iron boxes or casings perforated by a series of cores and fitted together by means of bars and angles in such a manner as to insulate entirely the mason work from the trusses.

The rafters will consist of five-inch deck beams secured to the top chord by double angle iron studs, 3½ by 3½ inches, and stiffened by diagonal braces of the same size, riveted together and fastened on the chord by means of bent lap plates, one-half inch thick, and riveted to the former. When completed, the upper part of the roof on the inside will present a perfect net-work of ties, braces, and other appliances to insure its stability. The ventilator on the ridge of the central skylight will be two feet wide in the clear, and will consist of two courses of cast iron gratings. The trussed girders will also be constructed to perform the duty of ventilators. The main portions of the roof not covered with glass will be covered with corrugated galvanized sheet iron, No. 18 American gauge, lapped into each other at least four inches.

The inside ornamentation will consist of panels bordered with beads and scroll angle pieces, screwed to the plate iron. The inner chord of each truss will be encased in a cast iron shell quarter-inch thick, having the shape of a column ornamented with spiral bands, base, plinth, and astragals; cast iron cornices will be run on both sides of the roof beneath the gutters and secured to ornamental brackets.

A line of railing will run along the platform on the south, and with hoisting gates leading to the inner platform. These railings will be three feet six inches high. The large and highly ornamental lamp-posts will be placed in such part of the car house as may be hereafter designated.

A heavy cast-iron cornice will be run across the segmental portion of the front of the south end, and a heavy pediment surmounting the cornice parallel to the truss and near it. These will be ornamented with dentils and modillions. The segmental space batween the cornice and pediment will be faced up with ornamental cast-iron panels, columns, and plate glass half an inch thick.

Along the Fourth avenue, on the exterior, will be placed a series of cast-iron pilasters, which will project six inches beyond the wall, be two feet two inches in width, and extend up to the cornice, which, with frieze and astragat will run the entire length of the car house, the whole to be surmounted with a line of balustrade, the posts of which are to be placed over and in a line with each pilaster. The doors and windows will have cast-iron trimmings, all ornamented, the windows to be glazed with rough half inch glass. The whole of the north front will be of cast iron, the width to be 203 feet 10 inches, and raised 112 feet 6 inches in extreme height The windows and doors of the first story will have rolling shutters.

The ends of the structure will be occupied for offices on the first floor, while the ground floor will be set apart for ticket offices, passengers' rooms, baggage lockers, restaurants, news stands, &c.

Pennsylvania iron, of the best welded quality, will be used as plates, flat or square bars, round bars and rods for braces to be of Ulster iron. Sheet-iron, best welded and regned Pennsylvania. Cast-iron, mixed in the following proportions, viz: American pig No. 1, and Scotch pig No. 1, five per cent. of each for shoes, castings, lintel, box, angle, studs and braces. American pig No. 1 ten per cent., and Scotch pig No. 1 fifteen per cent. for columns and palasters. American pig No. 1 fifteen per cent, and Scotch pig No. 1 twenty per cent., for hanging cornices, friezes and flat panelings. American pig No. 1 thirty per cent., and Scotch pig No. 1 thirty per cent. for small mouldings and ornamented work. All rolled and welded iron to be subjected to a strain of 30,000 pounds per sectional inch.—*New York Tribune.*

Regulation of Railroads by National instead of State Laws.

The New York *Times* in an article commenting on the decision of the United States Supreme Court which declared that the Kansas Pacific Railway Company was liable to State taxation, has the following:

The case suggests very forcibly the growing importance of devising some practical scheme of regulating the great railway system of the country. Sooner or later it must come under Federal control and be subject to Federal laws. The tendency all over the country is toward the consolidation of short lines into long ones, which extend through several States. The mere question of taxation by those States is a trivial one compared with other considerations which are continually arising, in which not only the road but the people are concerned. Take, as an illustration, the Lake Shore road, which passes through six States; or the Pacific, which extends through a country that will ultimately be cut up into twenty States. Is it to be tolerated that such corporations shall be at the mercy of the corrupt Legislatures of every State through which they pass?—or is it proper that a plaintiff against them shall be compelled to go into the courts of each of those States for judgment and execution?

Every reader who has had any experience in legal proceedings, or is familiar with railway matters as managed at present, will at once appreciate a great variety of cases in which a proper national railway law would be salutary. Railroad men, especially, are beginning to see the necessity for it which is rapidly coming. Our whole railway system is rapidly changing, and in a few years the country will be traversed in every direction by great consolidated lines under one management, each having its own policy and competitions with the others. If subjected to State control, they would become a fearful agency of corruption in the Legislatures. They would assail each other in those quarters, and if their interests should come in conflict with those of localities or of the public, it is not difficult to imagine the means which would be used at the State capitals.

The problem how best to deal with the coming difficulty is a serious one, and ought to involve grave consideration. We know that it has already received the earnest attention of some of the best minds in the country. We would not presume, now, to indicate any of the details of the plan which should be adopted; but we are confident that the American railway system must be nationalized, and very soon. It is a matter for earnest discussion, and in due time will receive it.

—Articles of consolidation of the Grayville & Mattoon Railroad Company and the Mt. Vernon & Grayville Railroad Company, under the corporate name and style of the Chicago and Illinois Southern Railroad Company, have been filed in the office of the Secretary of State. The consolidation stock amounts to $2,500,000.

—The stock of the city of Memphis in the Memphis in the Memphis & Ohio Railroad, amounting to $174,000, was lately sold at ten cents on the dollar.

Correspondence.

NEW ORLEANS CORRESPONDENCE.

Notes from Texas—Immigration—Railroads in Progress.

NEW ORLEANS, La., May 17, 1870

TO THE EDITOR OF THE RAILROAD GAZETTE:

During a late trip in Texas, I learned that there is an immense amount of improvement going on in every portion of that vast State. The amount of immigration that has found location in that country is greater in extent and numbers than we can estimate with any degree of accuracy. That there have been over two hundred and fifty thousand persons received permanently within its borders is a low calculation. A very considerable percentage of those who have settled in the tobacco, vine, wool-growing, wheat and other cereal producing sections are from the fertile prairie regions of Illinois, Iowa, Kansas, Missouri and Kentucky. About five hundred families are from Ohio and a like number from Indiana. From Pennsylvania there were perhaps five hundred people. A less number came from New York. From New England there were less than a thousand. But during the next year from date, there will be not less than ten thousand persons from the worn out, bleak and barren fields of New England to locate in the luxuriant and profitable farming regions of Texas. The greater number of this class of immigrants settle in communities, and it certainly is much the wisest course for them to pursue; as by this plan, they can live more economically, maintain their former private relations, and it renders them independent in their social relations, for the reason that they have their own society. This latter is a very desirable feature of community settlements, because, in Texas especially, the inhabited sections are widely separated and the isolation of families causes them to be shy of strangers, though they are seldom unsociable when visited. It is simply the habit of being so much alone that makes them slow to receive neighbors with familiar greetings. Sectionalism has something to do with it, though there is certainly less than new-comers expect to find. The status of immigrants in society is declared by themselves, the old settlers defining their position by the opinions they express on politics and the class of people they cultivate. I think, however, that people make their places in society in all countries in the same manner.

The difference between immigrants from the various sections is very marked in every particular custom and habit of life. The poor classes from the old, worn-out portions of the Southern States go into Texas with broken down wagons and ox teams; the people are sallow, live on bacon, corn bread and tobacco; the children are bilious and aguish in appearance and all have an indolent, careless, dreamy sort of manner about them. The better classes from the same sections give fine tone to society and present the old Southern type of style, manners, courtesy, hospitality and intelligence. The people from the north are almost all alike in their type and peculiarities of habits, appearance and manners. They universally have a box of books, the inevitable sewing machine, and very often an irrepressible melodeon or parlor organ, which answers both for family and Sunday School uses. The homes of Northerners have an air of thrift and neatness that is very suggestive of the section whence the various representatives come. The chief peculiarity, however, is that it matters not where these restless and active minds and bodies settle, their first proceeding is to start a movement for building a railroad from their particular locatian to the nearest main line. Hence there is an extraordinary interest in railroads in every portion of the State. The general topography of the country indicates the feasibility of constructing railroads at little expense throughout all the fertile and richly productive portions of Texas. The subsidies provided by legislative action also invite the attention and enterprise of operators from every quarter of the country. Hence this very Canaan for railroad contractors, builders and capitalists swarms with men of this class who have made famous names in their line of business everywhere on this continent.

Every line of railroad in Texas now under contract is being rapidly pushed to completion, and hence there is a vast amount of energy and enterprise apparent. I notice that the Houston & New Orleans Railroad is being put in order rapidly by the energetic trustees, who announce that it will be ready for traffic and constant use within a year. The Henderson road is being rapidly pushed northward and will have all its important side connections made within a year. The line intended to be the Southern Pacific is stretching its long iron arms westward at the rate of a mile per day. The excitement is increasing in Southern Texas, and hence the road from Victoria to Lavaca, the road from Indianola to the same line, and the continuation of the line to San Antonio, are being rapidly forwarded with a view to early completion. The vast importance and prospective profitable operation of these roads urges those who have it in hand to hurry it into running condition. It also will cause the fine prairie country on that coast to be rapidly settled with a fine class of people. Railroad laborers are scarce everywhere in Texas and throughout the South.

The Kansas roads, by which St. Louis hopes to secure the large amount of traffic and passengers that will come from Central Texas, seem likely to be rapidly pushed in that direction. This reminds me of a suggestion that will set your people to acting, I hope, with energy and promptness. Those of your people who have settled in Texas have an intense liking and affection for Chicago as a trading point, etc. They say it is the only city in the world. They send there for all manner of articles, including agricultural implements, steam engines, machinery of all kinds, plows, reapers, seed corn of fine class and varieties, and everything that they require. They have been used to dealing with your merchants and are eager to continue their custom, and hence they look forward with great anxiety and hope for the railways in Texas to be finished to New Orleans, that they may reach Chicago as quickly as possible, either in person or by orders, for the articles they require. These old home attachments are exceedingly strong amongst the immigrants in new countries and are only choked off by the impossibility of communication. As an example of this affectionate interest, I found THE RAILROAD GAZETTE treasured in the hands of people who had removed from your quarter.

The newest thing out in this city in the way of a motive is the use of ammoniacal gas, its expansion and liquifaction being secured by the same means used in ice-making machines. The experimental car produced a great excitement here. It succeeded to the satisfaction of the proprietors in a trial of ten miles run. The stench which is emitted is, however, so nasty and sickening, that the concentrated essence of the odor of skunks would be preferable. I suppose the inventor will provide some sort of cologne preparation to be used in the place of the triple extract of nastiness that was employed in the first trial.

CLAUDE.

TRAVELERS' TIME FOR THE CONTINENT.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Your correspondent on this pertinent and timely subject seems disposed to make a very simple matter unnecessarily complicated and difficult for the public to understand or adopt. If any change is ever made in the present system, it must be one that will be easily comprehended and learned.

Travelers' time ought to be about the mean of that somewhere in the centre of the continent, say Chicago, St. Louis or Omaha. That of either ocean is too great an extreme at the other end. If the capital of the republic were in the center, as it ought to be, this would not be difficult to adopt. At the present day every shipmaster navigating the ocean registers two different periods of time every day at 12 o'clock—that of his chronometer, which is always that of London (Greenwich) or Washington, and the sun time of the spot in the ocean where his ship may happen to be. By the difference in these two times he calculates his latitude and longitude, and understands how far he is from the port of his destination. Something of the same sort must assuredly be adopted in a country so vast as this, later, if not sooner.

Instead of changing the clock numerals and substituting letters of the alphabet for figures, it would be far more simple and easy to keep on, after 12 o'clock, noon, and instead of 1 p. m., say 13, and instead of 2 p. m., say 14, and so on, as the Italians do at the present day, throughout the twenty-four hours. There would be nothing too radical in this change to prevent its general adoption, and it is really the proper way to register all the hours of the day, and obviate the present confusion. To effect this, the additional figures might be placed inside the periphery of the dial, as you have placed the letters in your illustration of May 7.

IOWA.

[Our correspondent seems to have misapprehended the object of the new nomenclature of the 24 hours as proposed by "X. Sentrick." It is proposed purposely to make a distinction between railroad time and ordinary time. He believes that it would be impossible to make a radical change in the nomenclature general, or even to make a uniform standard of time; while a single "general order" would cause its adoption on a railroad line, and thence it might be extended to other lines, while for other purposes the present standards would remain unchanged. Then, as he stated, the mere naming of the hour would of itself indicate whether railroad or ordinary time was meant, and also whether the hour named was before or after noon. The adoption of this uniform standard of time and new nomenclature could then be introduced imperceptibly and without effort, as its merits and convenience became evident. If, as "Iowa" suggests, we should number the hours from one to twenty-four, as the Italians now do, there would be no confusion concerning p. m. and a. m., *after the system was universally understood and adopted*, which cannot be expected for many years to come, and hardly at all unless it can be applied to one particular purpose at first and thus introduced gradually, as is proposed by applying it to railroads].

THE NEW CONSTITUTION ON RAILROAD CORPORATIONS.

Below are given those portions of the new constitution which relate to railroads and railroad corporations. Sections 1 to 4, inclusive, relate to corporations generally. Sections 5 to 8, inclusive, which relate to banking corporations, we omit. Sections 9 to 15, inclusive, headed "railroads," are to be submitted to the people separately. If they do not receive an affirmative majority they will not become a part of the constitution:

ARTICLE XI.

Corporations.

SECTION 1. No corporation shall be created by special laws, or its charter extended, changed, or amended, except those for charitable, educational, penal, or reformatory purposes, which are to be and remain under the patronage and control of the State, but the General Assembly shall provide by general laws, for the organization of all corporations hereafter to be created.

SEC. 2. All existing charters or grants of special or exclusive privileges, under which organization shall not have taken place, or which shall not have been in operation within ten days from the time this constitution takes effect, shall thereafter have no validity or effect whatever.

SEC. 3. The General Assembly shall provide, by law, that in all elections for Directors or managers of incorporated companies, every stockholder shall have the right to vote, in person or by proxy, for the number of shares of stock owned by him, for as many persons as there are Directors or managers to be elected, or to cumulate said shares, and give one candidate as many votes as the number of Directors, mutiplied by the number of his shares of stock, shall equal, or to distribute them on the same principle among as many candidates as he shall think fit; and such Directors or managers shall not be elected by any other manner.

SEC. 4. No law shall be passed by the General Assembly, granting the right to construct and operate a street railroad within any city, town, or incorporated village, without requiring the consent of the local authorities having the control of the street or highway proposed to be occupied by such street railroad.

Railroads.—[Separate Article.]

SEC. 9. Every railroad corporation organized or doing business in this State under the laws or authority thereof, shall have and maintain a public office or place in this State for the transaction of its business, where transfers of stock shall be made, and in which shall be kept, for public inspection, books, in which shall be recorded the amount of capital stock subscribed, and by whom; the names of the owners of its stock and the amounts owned by them respectively; the amount of stock paid in, and by whom; the transfers of said stock; the amounts of its assets and liabilities, and the names and places of residence of its officers. The Directors of every railroad corporation shall annually make a report, under oath, to the Auditor of Public Accounts, or some officer to be designated by law, of all their acts and doings, which report shall include such matters relating to railroads as may be prescribed by law. And the General Assembly shall pass laws enforcing by suitable penalties the provisions of this section.

SEC. 10. The rolling stock, and all other movable property beloging to any railroad company or corporation in this State, shall be considered personal property, and shall be liable to to execution and sale in the same manner as the personal property of individuals and the General Assembly shall pass no law exempting any such property from execution and sale.

SEC. 11. No railroad corporation shall consolidate its stock, property or franchises with any other railroad corporation owing a parallel or competing line; and in no case shall any consolidation take place except upon public notice given, of at least sixty days, to all stockholders, in such manner as may be provided by law. A majority of the Directors of any railroad corporation now incorporated or hereafter to be incorporated by the laws of this State, shall be citizens and residents of this State.

SEC. 12. Railways heretofore constructed or that may hereafter be constructed in this State are hereby declared public highways, and shall be free to all persons for the transportation of their persons and property thereon, under such regulations as may be prescribed by law. And the General Assembly shall from time to time pass laws establishing reasonable maximum rates of charges for the transportation of passengers and freight on the different railroads in this State.

SEC. 13. No railroad corporation shall issue any stock or bonds, except for money, labor or property actually received and applied to the purposes for which such corporation was created: and all stock dividends, and other fictitious increase of the capital stock or indebtedness of any such corporation, shall be void. The capital stock of no railroad corporation shall be increased for any purpose, except upon giving sixty days public notice, in such manner as may be provided by law.

SEC. 14. The exercise of the power and the right of eminent domain shall never be so construed or abridged as to prevent the taking, by the General Assembly, of the property and franchises of incorporated companies already organized, and subjecting them to the public necessity the same as of individuals. The right of trial by jury shall be held inviolate in all trials of claims for compensation, when, in the exercise of the said right of eminent domain, any incorporated company shall be interested either for or against the exercise of said right.

SEC. 15. The General Assembly shall pass laws to correct abuses and prevent unjust discrimination and extortion in the rates of freight and passenger tariffs on the different railroads in this State, and enforce such laws by adequate penalties to the extent, if necessary for that purpose, of forfeiture of their property and franchises.

—At a meeting of superintendents of Western railroads crossing Indiana and Illinois south of Chicago in Indianapolis on the 13th inst., a summer time schedule was agreed upon which will take effect on the 29th inst. Very little change was made.

PUBLISHER'S ANNOUNCEMENTS.

The Babcock Fire Extinguisher on Railroad Trains.

The advantage of having on hand one of these machines for extinguishing incipient fires has been so often and so elaborately described that it is now nearly superfluous to enlarge upon their merits and the economy in having them in every building, but railroad managers have lately discovered, and it is strange it did not occur to them long before, that many of the fearful losses by fire may be avoided by having one or more of these machines on every train. These machines have been lately ordered for the Michigan Central; Illinois Central; Chicago, Burlington & Quincy; Lake Shore & Michigan Southern; Union Pacific; and Winona & St. Peter and other railroads.

Mr. Sargent, Superintendent of the Michigan Central Railroad, on sending out thirty of the extinguishers, this month (being the first installment of the one hundred or more that he considers necessary for the protection of his road), accompanied each with the following card circular of instructions:

"NOTICE TO CONDUCTORS AND TRAIN MEN.

"This machine is for use in case of fire "upon the train, or anywhere upon the line "where the company's interest require.

"If fire is noticed as kindling in wood piles, "or at stations where help is not at hand, "and where there is liability of any consider- "able loss, conductors will leave a man with "the machine, or hold the train, as in their "judgment seems best, until the charge of "the machine is expended, or the fire sub- "dued.

"Conductors will report all cases of use of "the train machine."

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In giving special prominence to this department of its business, attention is particularly called to the paramount advantages of employing this COMPANY in the capacity of AGENT, TRUSTEE, RECEIVER OR TREASURER, in preference to the appointment of INDIVIDUALS. A guarantee capital of ONE MILLION DOLLARS specially invested by requirement of its charter, and a perpetual succession; a central and permanent place of business, where business can be transacted daily, without disappointment or delay: its operations directed and controlled by a responsible Board of Trustees; and its entire management also under the supervision of the Supreme Court and the Comptroller of the State.

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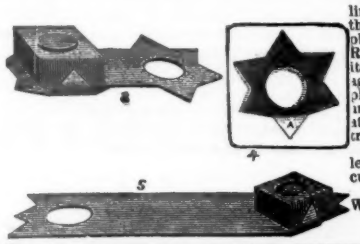

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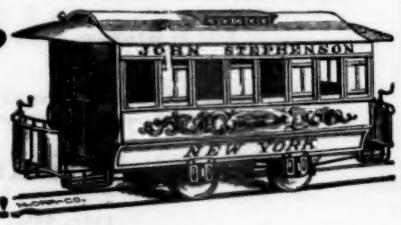

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The attention of RAILROAD MEN is invited to the item on page 182—"The Babcock Extinguisher on Railroad Trains."

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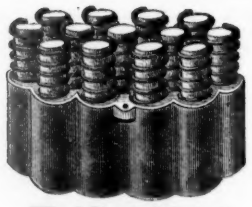

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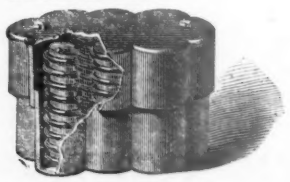

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Important to Railway Companies!

THE following, which we take from one of our exchanges, is but an illustration of how much money railroad companies are and have been paying for the old-style baggage-check, and how easy it is for them to be daily purchasing baggage-checks, until they amount to millions ere they are aware of the fact:

"*A Rash Promise.*—A paper tells the following story of a young lady who is a pupil at one of the schools in this city, and who has already, it seems, beaten her father at mathematics. She modestly proposed that if her father would give her only one cent on one day, and double the amount on each successive day for just one month, she would pledge herself never to ask of him another cent of money as long as she lived. Pater-familias, not stopping to run over the figures in his head, and not supposing it would amount to a large sum, was glad to accept the offer at once, thinking it also a favorable opportunity to include a possible marriage dowry in the future. At the twenty-fifth day, he became greatly alarmed, lest, if he complied with his own acceptance, he might be obliged to be 'declared a bankrupt on his own petition.' But at the thirtieth day, the young girl demanded only the pretty sum of $5,368,719 12. The astonished merchant was only too happy to cancel the claim by advancing a handsome cash payment for his folly in allowing himself to give a bond—or his word he considered as good as a bond—without noticing the consideration therein expressed, and by promising to return to the old custom of advancing smaller sums daily until otherwise ordered."

In comparing the above with the cost of baggage-checks, it is well known by every baggage-man that to supply a road perfectly with checks, it is necessary that the baggage should have on it *a check which, of itself, indicates the station for which the baggage is destined*; if it has not, the baggage-check is not perfect or complete. As every intelligent person can conceive at a glance, to bring the checking of baggage to such a state of perfection with the old style of baggage-check would cost an immense amount of money, as per example: We will take the New Jersey Railroad; we will say that it has twenty stations; it will require one thousand checks from New York to Newark, one thousand from New York to Elizabeth, one thousand from New York to Rahway, one thousand from New York to New Brunswick, and so on to the whole twenty stations. Then we again commence with one thousand from Newark to all stations, one thousand from Elizabeth to all stations, and so on until all stations are supplied, then we have just commenced; as other stations are added, and other connections made, all this must be done over and over again, and there is no help for it so long as railroad companies continue to use the old-style check and system of checking baggage. The next question is, how to obviate the necessity of purchasing this immense amount of baggage-checks? Simply by adopting the Thomas Safety Baggage-Check and system of checking baggage. By its use, it matters not how many different stations are opened, or how many connections are made, the *one check will go to every one of them*, and, by so doing, save tens, if not hundreds of thousands of dollars to railroad companies, and, at the same time, obviate the necessity of purchasing checks by the million.

The following, from S. E. Mayo, Esq., General Ticket Agent of the Albany & Susquehanna Railway—a gentleman who has given the checking of baggage a most careful, practical consideration—is but one from nearly forty representatives of the best-managed roads in the country in reference to its incomparable value *both as a local and through check*:

"In reference to the Thomas Safety Railroad Baggage-Check, it has no equal; and, if I were not thoroughly convinced by personal experience, that it merits all and more than is claimed for it, I would not speak so highly in its favor. As you are aware, we have recently added a large number of new *through tickets* to our stock—with the Erie Railway, alone, some 38 different forms. With the old style of checking baggage, I should have been compelled to buy not less than 3,800 checks for those 38 stations, which is obviated by the Thomas system of checking baggage. Instead of covering the whole side of my baggage-room with 3,800 different forms of baggage-checks, I simply add 38 forms of station-cards to my collection, in a thirty-inch case, alongside of which are my brass checks for any station designated by card. Another great advantage possessed by this check over the old style, is, if we should discontinue our connection with any route, the Thomas Check is not lost or become useless, as is the case with the old style of checking baggage, but with the cards, they at once become available elsewhere. Experience daily convinces me that the Thomas Check *is the only economical, systematic and safe check in use*, and that it will not be possible much longer for its opposers to close their eyes upon its many great advantages over all other checks and systems of checking baggage, and it must ultimately commend itself to any and all who are not too prejudiced to give it a fair trial. I therefore recommend it with perfect confidence to all railroad companies as the best baggage check in use, *for both local and through travel*."

HENRY STEFFEE, Esq., G. T. A. of the Louisville, Cincinnati & Lexington Railroad, says:

G. F. THOMAS, Esq., 90, 92 and 94 Grand Street, New York:

DEAR SIR: It is with much pleasure that I am able to inform you that our baggage-men consider the Thomas Improved Safety Baggage-Check unequaled. They inform me that it facilitates the checking of baggage wonderfully, in consequence of being able to send, with any check, a piece of baggage from any station to any station, and not being compelled to spend several minutes in looking for a particular check for a certain station; by the use of your check, they save from one-half to two-thirds of the time required to check baggage by the old style of check, and with much more certainty. To stock our road as perfectly with the old style of check as we have with yours, would require, at the least calculation, full twenty times the number of checks, which, in place of simplifying, complicates the checking of baggage; your check obviates all this complexity, and so simplifies the business that it is impossible to make a mistake, unless through gross negligence or incompetency. Previous to the introduction of the Thomas Check, in consequence of the great expense, no road would even think of bringing the checking of baggage to such a state of perfection as yours does, it requiring such large quantities of brass checks to do the business *as it ought to be done*, which is the reason such a great number of railroads, even to this day, adhere to the old English style of pasting and chalking baggage. I am satisfied that, if the officers of all the railroads were as well acquainted with the superiority of your check in every respect as are the officers of those roads upon which it is in use, it would be universally adopted, *both as a local and through check*, not only on account of its accuracy, economy and certainty, but also in consequence of its unequaled advantages in facilitating and simplifying the whole baggage business.

S. SCHOCH, Esq., Superintendent of the Morris & Essex Railroad, says:

"We have used the Thomas Safety Baggage Check on our road over two years, during which time we have never lost a piece of baggage to which it was attached, but, on the contrary, the baggage in every instance arrives at its place of destination with unerring certainty. We do, therefore, without the least hesitancy, recommend its use to any railroad company, being fully satisfied, after the most thorough trial, that, for a safe, reliable railroad baggage check, it has no equal, and, were it at this time in use upon every road in the country, the checking of baggage would not only be reduced to a perfect system, but would also be the means of saving railroad companies fully one-half of the present cost of conducting the baggage business."

JAMES M. WHITE, Esq., Train Master of the Central Railroad of Georgia, says:]

"We are much pleased with the Thomas Patent Safety Baggage Check. They are just the check required by railroad companies, as they can be prepared in advance, or changed in a moment, for any station, and *a very small number of brass checks does the work of many*. There is not the least doubt but that it will in time take the place of all other baggage checks now in use."

A. C. DAVIS, Esq., G. T. A. of the Belvidere, Delaware & Flemington Railroad, says:

"The Thomas Safety Baggage Check works to our entire satisfaction. No failure in the transmission of baggage since we commenced its use over two years ago. The baggage masters are pleased with them, and I am well satisfied they are the best baggage check in use, and better calculated to perform the various duties of *both local and through business* than any or all other baggage checks I have ever seen. Every check is, and has been, kept in constant use since we first commenced using them; and, so far as certainty, simplicity and economy are concerned, they have no equal."

☞ All necessary information in reference to the Thomas Patent Safety Railroad, Steamboat and Express Baggage Check will be given by addressing

G. F. THOMAS, Editor Appleton's R'y Guide,

90, 92, 94 Grand St., New York.

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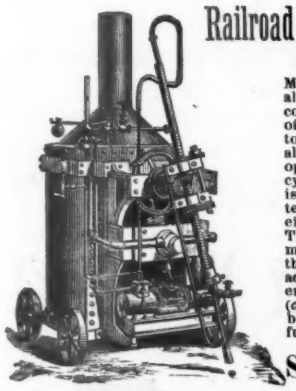

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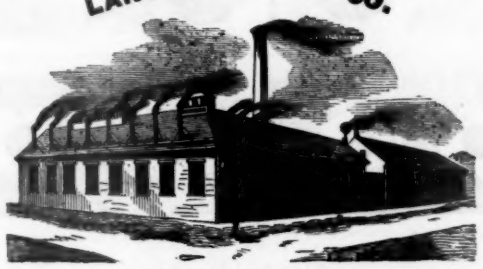

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CARS RUN THROUGH TO

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IN FOUR AND FIVE DAYS!

☞ Contracts made at the Offices of the Line. ☜

C. Shutter, Agent, 247 Broadway, New York. **A. Cushman, Agent,** Old State House, Boston, Mass.

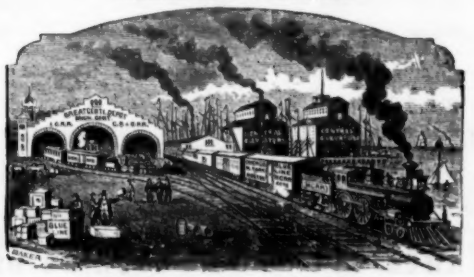
W. D. MANCHESTER, Agent, 54 Clark St., Chicago.

Great Central Route.

"BLUE LINE."

ORGANIZED JANUARY 1, 1867.

1870.



1870.

OWNED AND OPERATED BY THE

Michigan Central, Illinois Central, Chicago, Burlington & Quincy, Chicago & Alton, Great Western (of Canada), New York Central, Hudson River, Boston & Albany, and Providence and Worcester Railroads.

THE **"BLUE LINE"** is the only route that offers to shippers of freight the advantages of an unbroken gauge through from Chicago to the Seaboard, and to all Interior Points on the line of Eastern Connections beyond Suspension Bridge and Buffalo. All Through Freight is then transported between the most distant points of the roads in interest.

WITHOUT CHANGE OF CARS!

The immense freight equipment of all the roads in interest is employed, as occasion requires, for the through service of this Line, and has of late been largely increased. This Line is now prepared to extend facilities for the transit and delivery of all kinds of freight in Quicker Time and in Better Order than ever before.

The Blue Line Cars

are all of a solid, uniform build, thus largely lessening the chances of delay from the use of cars of a mixed construction, and the consequent difficulty of repairs, while remote from their own roads. The Blue Line is operated by the railroad companies who own it, without the intervention of intermediate parties between the Roads or Line and the public.

Trains run through with regularity **IN FOUR OR FIVE DAYS** to and from New York and Boston. Especial care given to the Safe and Quick Transport of Property Liable to Breakage or Injury, and to all **Perishable Freight.**

Claims for overcharges, loss or damage, promptly settled upon their merits. Be particular and direct all shipments to be marked and consigned *via*

"BLUE LINE."

☞ *FREIGHT CONTRACTS* given at the offices of the company in Chicago, New York and Boston.

J. D. HAYES, GEN. MANAGER,...Detroit.
C. E. NOBLE,....No. 8 Astor House, N. Y.
N. D. MUNSON,.....Quincy, Ill.
GEO. E. JARVIS,.....273 Broadway, N. Y.
P. K. RANDALL,..No. 11 State St., Boston
F. A. HOWE,....31 Dearborn St., Chicago
W. W. STREET,..31 Dearborn St., Chicago
J. JOHNSON,.....Cairo, Ill

THOS. HOOPS, GEN. FR'T AGT. Michigan Central Railroad, Chicago.
A. WALLINGFORD, AGT. GRT. WEST'N R. R., No. 91 Lake St., Chicago.
N. A. SKINNER, Freight Agent Michigan Central Railroad.

Empire Line!

THE EMPIRE TRANSPORTATION COMPANY'S

Fast Freight Line to the East

—AND—

TO THE COAL AND OIL REGIONS,

Via Michigan Southern, Lake Shore, and Philadelphia & Erie R. R.'s,

WITHOUT TRANSFER!

Office, No. 72 LaSalle Street, Chicago.

GEO. W. RISTINE, Western Superintendent, Cleveland, Ohio.

W. G. Van Demark,..265 Broadway, New York. | **E. L. O'Donnell,**.....Baltimore, Md
G. B. McCulloh,....42 South 5th St., Philadelphia. | **Wm. F. Smith,**.....Erie, Penn.

JOHN WHITTAKER, Pier 14 North River, New York.

JOSEPH STOCKTON, Agent, Chicago.

W. T. HANCOCK, Contracting Agent.
WM. F. GRIFFITTS, Jr., Gen. Freight Agent, Philadelphia.

CHICAGO, ROCK ISLAND & PACIFIC RAILROAD.

☞ THE DIRECT ROUTE FOR

Joliet, Morris, Ottawa, La Salle, Peru, Henry, Lacon, Peoria, Geneseo, Moline, Rock Island,

DAVENPORT, MUSCATINE, WASHINGTON, IOWA CITY,

Grinnell, Newton, Des Moines,

COUNCIL BLUFFS & OMAHA

CONNECTING WITH TRAINS ON THE UNION PACIFIC RAILROAD, FOR

CHEYENNE, DENVER, CENTRAL CITY, OGDEN, SALT LAKE, WHITE PINE, HELENA, SACRAMENTO, SAN FRANCISCO,

And Points in Upper and Lower California; and with Ocean Steamers at San Francisco, for all Points in **China, Japan, Sandwich Islands, Oregon and Alaska.**

☞ TRAINS LEAVE their Splendid new Depot, on VanBuren Street, Chicago, as follows:

	LEAVE.	ARRIVE.
PACIFIC EXPRESS, (Sunday excepted)	10.00 a. m.	3.35 p. m
PERU ACCOMMODATION, (Sundays excepted)	5.00 p. m.	9.50 a. m
PACIFIC EXPRESS, (Saturdays excepted,)	10.00 p. m.	[Mon. ex. 6.00 a. m

Elegant Palace Sleeping Cars run Through to Peoria & Council Bluffs WITHOUT CHANGE!

TICKETS TO ST. LOUIS!

FIRST CLASS, including Meals and Berths on Steamer bet. Peoria and St. Louis, - **$8.00**
SECOND CLASS, - - - - - - - - - - - - - **$5.50**

AN ELEGANT PASSENGER STEAMER

Leaves Peoria every morning for St. Louis, upon arrival of Night Express, leaving Chicago daily (Saturday excepted) at **11 00 P. M.**, from Great Rock Island Depot, head of LaSalle St., arriving in St. Louis the following morning, connecting with morning trains leaving the city, and with steamers down the River.

Families Emigrating to Missouri or Kansas, will find this the most desirable and cheapest Route, as through Freight Rates for household goods are much lower than all rail routes.

☞ Connections at LA SALLE, with Illinois Central Railroad, North and South; at PEORIA, with Peoria, Pekin & Jacksonville Railroad, for Pekin, Virginia, &c.; at PORT BYRON JUNCTION, for Hampton, LeClaire, and Port Byron; at ROCK ISLAND, with Packets North and South on the Mississippi River.

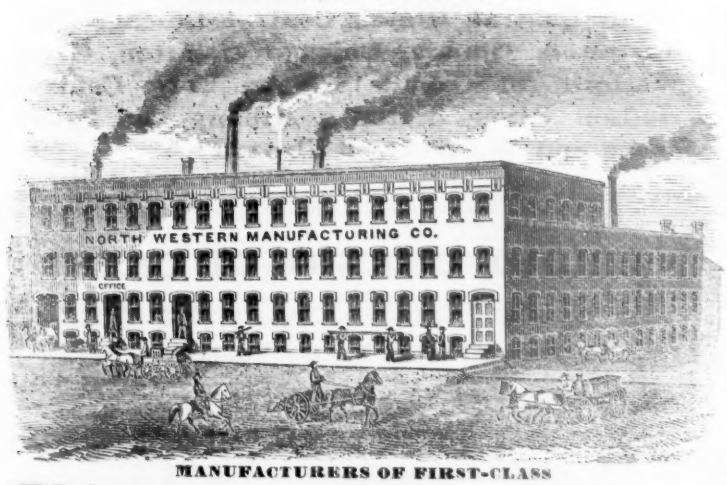
☞ **For Through Tickets,** and all desired information in regard to Rates, Routes, etc., call at the Company's Office, No. **37** South Clark Street Chicago.

A. M. SMITH, Gen. Pass. Agent. HUGH RIDDLE, Gen. Supt. P. A. HALL, Asst. Gen. Supt.

R. T. CRANE, President. C. S. CRANE, Vice-President. S. W. ADAMS, Secretary.

THE NORTHWESTERN MANUFACTURING COMPANY,

SUCCESSORS TO R. T. CRANE & BRO.



MANUFACTURERS OF FIRST-CLASS

Steam Engines

[HORIZONTAL AND UPRIGHT,]

With Tremain's Patent Balance Valve,

Brass and Iron Goods for Steam and Gas Fitters and Engine Builders, Malleable Iron Castings, &c.

STEAM PUMPS, AND GENERAL MACHINERY,

WROUGHT IRON PIPE,

CONSTRUCTORS OF R. T. CRANE'S

PATENT STEAM WARMING & VENTILATING APPARATUS,

Perfected, Simplified and adapted to Dwellings, School-houses, Churches, &c., &c.

Jefferson St., between Lake and Randolph, Chicago.

OFFICE: 100 WASHINGTON ST.

CHAS. J. PUSEY, **P. O. Address—Box 5222.** EDW'D H. PARDEE.

Pusey & Pardee,

74 BROADWAY, NEW YORK.

American and English Rails,

LOCOMOTIVES AND CARS, FISH-PLATES, SPIKES, &c.

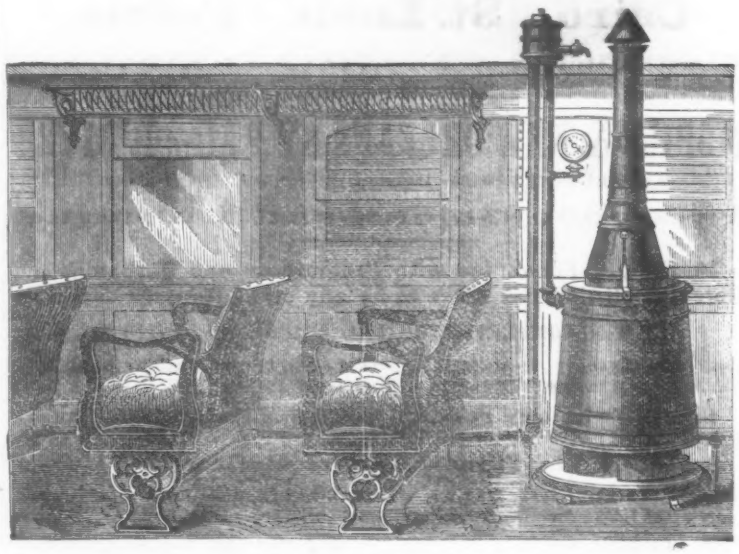
—SOLE AGENTS FOR—

Atkins Brothers' Pottsville Rolling Mills, and G. Buchanan & Co., of London.

☞ Special attention given to filling orders for small T and **STREET RAILS,** of every weight and pattern.

OLD RAILS BOUGHT OR RE-ROLLED, AS DESIRED.

WARMING AND VENTILATING Railroad Cars BY HOT WATER.



BAKER'S PATENT CAR WARMER.—One way of Applying it.

A very simple, safe and efficient plan for

Warming Railway Carriages!

—BY—

HOT WATER PIPES,

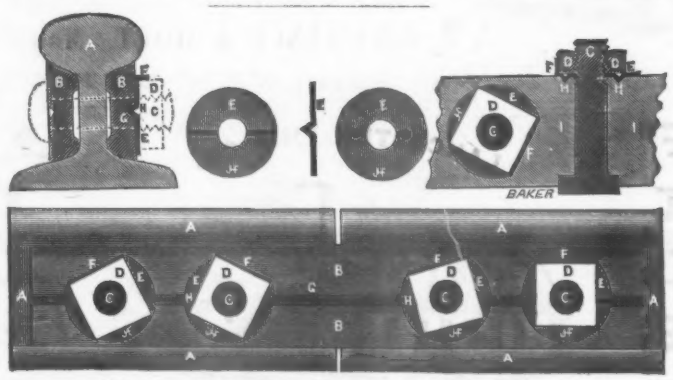
WHICH RADIATES THE HEAT DIRECTLY AT THE FEET OF EACH PASSENGER WITHOUT THE NECESSITY OF GOING TO THE STOVE TO GET WARMED!

☞ All the finest Drawing-Room and Sleeping Cars in the United States have it, or are adopting it. Full descriptive pamphlets furnished on application.

Baker, Smith & Co.,

Cor. Greene and Houston Sts., N. Y., and 127 Dearborn St., Chicago.

Fisher's Lock Nut Washer!



Patented April 19th, 1869, by J. HYDE FISHER, Chicago, Ill.

A CHEAP, SIMPLE, DURABLE AND PERFECT LOCK,

To Prevent Nuts from Jarring Loose on Fish Plates, Cars, Engines, Carriages, Trucks or Machinery of any character where Nuts are used Manufactured by

FISHER & JACKSON,

53 La Salle Street, Chicago.

MANSFIELD ELASTIC FROG COMPANY

OF CHICAGO.

AMOS T. HALL, President. J. H. DOW, Superintendent.

Are now prepared to receive and promptly execute orders for RAILROAD FROGS and CROSSINGS, warranted to prove satisfactory to purchasers.

For DURABILITY, SAFETY and ELASTICITY—being a combination of Steel, Boiler Plate and Wood—they are UNEQUALED, as Certificates of Prominent Railroad Officials will testify.

The SAVING TO ROLLING STOCK AND MOTIVE POWER is at least equal to double the cost of the FROG. Orders should be addressed to

CRERAR, ADAMS & CO., Gen'l Agents,

No. 18 Wells Street, CHICAGO.

CHICAGO & NORTHWESTERN R. W.

Comprising the PRINCIPAL RAILROADS from CHICAGO Directly NORTH NORTH-WEST and WEST.

ALL RAIL TO THE PACIFIC OCEAN!

Great California Line.

TRAINS LEAVE WELLS STREET DEPOT AS FOLLOWS:

8:15 A. M. Cedar Rapids Pass | **11:00 P. M. Night Mail.**
10:45 A. M. Pacific Express. | **11:00 P. M. R. Island Pass.**
10:45 A. M. Rock Island Exp. | **4:00 P. M. Dixon Passenger.**

For Fulton, Clinton, Cedar Rapids, Boone, Denison, Missouri Valley Junction, Sioux City, Council Bluffs and Omaha, there connecting with the

UNION PACIFIC R. R.

For Cheyenne, Denver, Ogden, Salt Lake, the White Pine Silver Mines, Sacramento, San Francisco, and all parts of Nebraska, Colorado, New Mexico, Arizona, Wyoming, Montana, Idaho, Utah, Nevada, and the PACIFIC COAST.

FROM CHICAGO	Hours.	1st Class Fare.	FROM CHICAGO	Days.	1st Class Fare.
To OMAHA,.....	23	$20.00	To SACRAMENTO,.	4½	$118.00
" DENVER,.....	52	70.75	" SAN FRANCISCO,	5	118.00

TRAINS ARRIVE:—Night Mail, 7.00 a. m.; Dixon Passenger, 11.10 a. m.; Pacific Express, 3:25 p. m.; Rock Island Express, 3:25 p. m.; Cedar Rapids Passenger, 6:50 p. m.

FREEPORT LINE.

9.00 A. M. & 9.45 P. M. For Belvidere, Rockford, Freeport, Galena, Dunleith, and St. Paul.

4.00 P. M., Rockford Accommodation.
5.30 P. M., Geneva and Elgin Accommodation
6.10 P. M., Lombard Accommodation.

TRAINS ARRIVE:—Freeport Passenger, 2:30 a. m., 3:00 p. m.; Rockford Accommodati: 11:05 a. m.; Geneva and Elgin Accommodation, 8:45 a. m.; Lombard Accommodation, 6:50 a. m.

WISCONSIN DIVISION.

☞ Trains leave Depot, cor. West Water and Kinzie Sts., daily, Sundays excepted, as follows:

10.00 A. M. DAY EXPRESS, for Janesville, Monroe, Whitewater, Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Neenah, Appleton, and Green Bay.

3.00 P. M., Janesville Accommodation.

5.00 P. M. NIGHT EXPRESS, for Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Menasha, Appleton, Green Bay, and THE LAKE SUPERIOR COUNTRY.

5.30 P. M., Woodstock Accommodation.
6:20 P. M., Harvard Accommodation.

TRAINS ARRIVE:—5:30 a. m., 7:45 a. m., 1:10 a. m., 1:00 p. m. and 7:15 p. m.

MILWAUKEE DIVISION.

MILWAUKEE MAIL.....	8:00 A. M.
EXPRESS, (ex. Sun.) Waukegan, Kenosha, Racine and Milwaukee,....	10:00 A. M.
EVANSTON ACCOMMODATION,.....	5:00 P. M.
MILWAUKEE ACCOMMODATION, with Sleeping Car attached.....	11:40 A. M.
EVANSTON ACCOMMODATION, (Daily,) from Wisconsin Div. Depot.....	11:00 P. M.
KENOSHA ACCOMMODATION, (Sundays excepted) from Wells St. Depot.....	1:30 P. M.
AFTERNOON PASSENGER, from Milwaukee Div. Depot.....	4:15 P. M.
WAUKEGAN ACCOMMODATION, (except Sundays) from Wells St. Depot.....	5:00 P. M.
WAUKEGAN PASSENGER, (Sundays excepted) from Wells St. Depot.....	5:25 P. M.
	6:15 P. M.

TRAINS ARRIVE:—Night Accommodation, with Sleeping Car, 5:00 a. m.; Day Express, 4:30 p. m. Milwaukee Mail, 10:15 a. m.; Afternoon Passenger, 8:00 p. m.; Waukegan Accommodation, 8:25 a. m.; Kenosha Accommodation, 9:10 a. m.; Evanston Accommodations, 1.50 and 4.00 p. m.; Waukegan Passenger, 7:55 a. m.

PULLMAN PALACE CARS ON ALL NIGHT TRAINS.

THROUGH TICKETS Can be purchased at all principal Railroad Offices East and South, and in Chicago at the Southeast corner of Lake and Clark Streets, and at the Passenger Stations as above.

H. P. STANWOOD, Gen. Ticket Agt. **JNO. P. HORTON,** N. W. Pass. Agt. **GEO. L. DUNLAP,** Gen'l Supt.

Western Union Railroad.

CHICAGO & NORTHWESTERN DEPOT, CHICAGO. | MILWAUKEE & CHICAGO DEPOT, MILWAUKEE.

THE DIRECT ROUTE!

CHICAGO, RACINE & MILWAUKEE,

— TO —

Beloit, Savanna, Clinton, Pt. Byron, Davenport, Mineral Point, Madison, Freeport, Fulton, Lyons, Rock Island, Sabula, Galena, Dubuque, Des Moines, Council Bluffs,

OMAHA, SAN FRANCISCO

AND ALL PRINCIPAL POINTS IN

Southern and Central Wisconsin, Northern Illinois, and Central and Northern Iowa.

FRED. WILD, Gen. Ticket Agent. **D. A. OLIN,** Gen Superintendent.

CRERAR, ADAMS & CO.,

MANUFACTURERS AND DEALERS IN

Railroad Supplies!

—AND—

CONTRACTORS' MATERIAL.

11 and 13 Wells Street,

CHICAGO, ILL.

Manufacturers of IMPROVED HEAD-LIGHTS for Locomotives, Hand and Signal Lanterns, Car and Station Lamps, Brass Dome Casings, Dome Mouldings, Cylinder Heads, and Car Trimmings, of Every Description.

Pan-Handle

—AND—

Penn'a Central Route East!

☞ SHORTEST AND QUICKEST ROUTE, VIA COLUMBUS, TO ☜

PITTSBURGH, BALTIMORE, PHILADELPHIA & NEW YORK

On and after Saturday, JANUARY 1st, 1870, Trains for the East will run as follows:

[DEPOT CORNER CANAL AND KINZIE STS., WEST SIDE.]

6:45 A. M. NEW YORK EXPRESS.

[SUNDAYS EXCEPTED.] Arriving at

COLUMBUS ....8:55 P. M.	HARRISBURG...2.30 P. M.	NEW YORK.....10:26 P. M.	WASHINGTON
PITTSBURGH....4:47 A. M.	PHILADELPHIA 7:00 P. M	BALTIMORE.... 7:00 P. M.	CITY.....10:00 P. M.

7:45 P. M. NIGHT EXPRESS.

[SATURDAYS EXCEPTED.] Arriving at:

COLUMBUS...11:10 A. M.	HARRISBURG. 5:20 A. M	NEW YORK....12:05 P. M.	WASHINGTON. 1:00 P. M.
PITTSBURGH.. 7:05 P. M.	PHILADELPHIA.9.40 A. M.	BALTIMORE... 9:00 A. M.	BOSTON.....11:50 P. M.

Woodruff's Palace Day and Sleeping Cars

Run Through to COLUMBUS, and from Columbus to NEW YORK, WITHOUT CHANGE!

ONLY ONE CHANGE TO NEW YORK, PHILADELPHIA, OR BALTIMORE!

TRY THE NEW ROUTE. FARE AS LOW AS BY OTHER LINES.

CINCINNATI & LOUISVILLE AIR LINE SOUTH.

42 Miles the Shortest Route to Cincinnati,
18 Miles the Shortest Route to Indianapolis and Louisville.

—FROM ONE TO—

2 Hours the Quickest Route to Cincinnati!

THE SHORTEST AND BEST ROUTE TO

Columbus, Chillicothe, Hamilton, Wheeling, Parkersburg, Evansville, Dayton, Zanesville, Marietta, Lexington, Terre Haute, Nashville,

ALL POINTS IN CENTRAL & SOUTHERN OHIO, & INDIANA, KENTUCKY & VIRGINIA.

— QUICK, DIRECT AND ONLY ALL RAIL ROUTE TO —

New Orleans, Memphis, Mobile, Vicksburg, Charleston, Savannah,

AND ALL POINTS SOUTH.

Cincinnati, Indianapolis and Louisville Trains run as follows:

THROUGH WITHOUT CHANGE OF CARS!

6:45 A. M. (Sundays excepted) Arriving at		7:45 P. M. (Saturdays excepted.) Arriving at	
LOGANSPORT.....	...12:10 P. M.	LOGANSPORT.....	1:30 A. M.
KOKOMO.....	1:40 P. M.	KOKOMO.....	2:49 A. M.
CINCINNATI.....	9:40 P. M.	CINCINNATI.....	10:00 A. M.
INDIANAPOLIS	4:30 P. M.	INDIANAPOLIS.....	6:00 A. M.
LOUISVILLE.....	11:30 A. M.	LOUISVILLE.....	3:20 P. M.

Lansing Accommodation: Leaves 3:45 P. M. Arrives 9:15 A. M.

PULLMAN'S PALACE SLEEPING CARS!

Accompany all Night Trains between Chicago and Cincinnati or Indianapolis.

☞ Ask for Tickets **via COLUMBUS** for the East, **via HAGERSTOWN** for Cincinnati, and **via KOKOMO** for Indianapolis, Louisville and points South. Tickets for sale and Sleeping Car Berths secured at **95 RANDOLPH STREET, CHICAGO,** and at Principal Ticket Offices in the West and Northwest.

WM. L. O'BRIEN, Gen. Pass. and Ticket Agent, Columbus. **I. S. HODSDON,** Northwestern Pass. Agt., Chicago.

KANSAS PACIFIC RAILWAY.

Great Smoky Hill Route!

— TO —

COLORADO, NEW MEXICO, ARIZONA, UTAH,

Montana, Nevada, California and Northern States of Old Mexico.

COMPLETED THROUGH KANSAS, TO

Carson, Colorado, 487 Miles West of Kansas City and Leavenworth.

Close Connections are made with Express Trains of the HANNIBAL & ST. JOSEPH and NORTH MISSOURI RAILROADS, at KANSAS CITY, and with MISSOURI PACIFIC RAILROAD at STATE LINE.

DAILY EXPRESS TRAINS are run between

KANSAS CITY, LEAVENWORTH, LAWRENCE,

Topeka, Wamego, Manhattan, Junction City, Salina, Brookville,

HARKER, HAYS and CARSON.

Pullman's Sleeping Cars Attached to Night Express Trains!

Passenger Time from Kansas City to Denver, Less than 50 Hours.

Hughes & Co.'s Four-Horse Concord Coaches leave Carson daily for Denver, Central City, Georgetown, &c.

Southern Overland Passenger Express and Mail Coaches leave Carson daily for Fort Lyon, Pueblo, Trinidad, Fort Union, Las Vegas, Santa Fe, &c.

Ask for Through Tickets via Kansas Pacific Railway, "Smoky Hill Route." Freight and Passage Rates as Low and Time as Quick as by any other Route.

R. B. GEMMELL, Gen. Ticket Agent. **A. ANDERSON,** Gen. Supt.

THE FAVORITE THROUGH PASSENGER ROUTE!

Chicago, Burlington & Quincy

RAILROAD AND CONNECTIONS.

3 THROUGH EXPRESS TRAINS DAILY.

FROM CHICAGO	Hours.	1st Class Fare.	FROM CHICAGO	Days.	1st Class Fare.
To OMAHA, - -	23	$20.00	To DENVER, - -	2¼	$70.75
" ST. JOSEPH, -	21	19.50	" SACRAMENTO,	4½	118.00
" KANSAS CITY, -	22	20.00	" SAN FRANCISCO,	5	118.00

TRAINS LEAVE CHICAGO from the Great Central Depot, foot of Lake Street, as follows:

BURLINGTON, KEOKUK, COUNCIL BLUFFS AND OMAHA.

7:40 A. M. **MAIL AND EXPRESS,** (Daily except Sunday,) stopping at all stations between Chicago and Burlington; making close connections at Mendota with Illinois Central for Amboy, Dixon, Freeport, Galena, Dunleith, Dubuque, LaSalle, El Paso, Bloomington, &c., &c.

10:45 A. M. **PACIFIC EXPRESS,** (Daily except Sunday,) stopping only at Riverside, Hinsdale, Aurora, Leland, Mendota, Princeton, Rock Island Crossing, Buda, Kewanee, Galva, Galesburg, and Monmouth, between Chicago and Burlington. **PULLMAN PALACE DRAWING ROOM CAR** attached to this train daily from Chicago

TO COUNCIL BLUFFS AND OMAHA, WITHOUT CHANGE!

11:30 P. M. **NIGHT EXPRESS,** (Daily, except Saturday,) stopping at all principal stations between Chicago and Burlington. ELEGANT DAY COACHES, and a **PULLMAN PALACE SLEEPING CAR** are attached to this train from **Chicago to Burlington, without change!** This is the only Route between

CHICAGO, COUNCIL BLUFFS & OMAHA,

— RUNNING THE CELEBRATED —

Pullman Palace Dining Cars!

The Shortest, Best, Quickest and only Route between

CHICAGO & KEOKUK,

Without Ferrying the Mississippi River!

QUINCY, ST. JOSEPH, LEAVENWORTH AND KANSAS CITY.

10:45 A. M. **PACIFIC EXPRESS,** (Daily, except Sunday,) with PALACE COACH attached, running through from Chicago to KANSAS CITY, **Without Change!**

5:00 P. M. **EVENING EXPRESS,** (Daily, except Sunday,) with **Pullman Palace Drawing Room Sleeping Car** attached, running through from Chicago to QUINCY, WITHOUT CHANGE!

11:30 P. M. **NIGHT EXPRESS** (Daily, except Saturday,) with **Pullman Palace Sleeping Car** attached from Chicago to GALESBURG; PALACE DAY COACHES from Chicago to QUINCY, **Without Change!**

☞ This is the Shortest, Quickest and only Route between ☜

CHICAGO AND KANSAS CITY,

WITHOUT CHANGE OF CARS OR FERRY.

THE SHORTEST, BEST AND QUICKEST ROUTE BETWEEN CHICAGO AND

St. Joseph, Atchison, Weston, Leavenworth,

AND ALL POINTS ON THE KANSAS PACIFIC R'Y.

Local Trains Leave { RIVERSIDE & HINSDALE ACCOMMODATION, 7:00 A. M. 1:30 & 6:15 P. M.
MENDOTA PASSENGER ..... 4:15 P. M.
AURORA PASSENGER ..... 5:30 P. M.

Trains Arrive:—Mail and Express, 8:45 p. m; Atlantic Exp., 4:15 p. m., except Sunday; Night Exp. 9:40 a. m., except Monday; Mendota Passenger, 10:10 a. m.; Aurora Passenger, 8:15 a. m.; Quincy Passenger 7:30 P. M.; Riverside and Hinsdale Accommodation, 6:50 and 9 a. m and 5:30 p. m., except Sunday.

Ask for Tickets via Chicago, Burlington & Quincy Railroad, which can be obtained at all principal offices of connecting roads, and at Company's office in Great Central Depot, Chicago, at as low rates as by any other route.

ROB'T HARRIS, Gen'l Superintendent, CHICAGO.
SAM'L POWELL, Gen'l Ticket Agent, CHICAGO.
E. A. PARKER, Gen. West. Pass. Agt., CHICAGO.

☞ **PASSENGERS GOING WEST!** ☜

To Missouri, Kansas, Nebraska, Colorado or New Mexico, Should Buy Tickets via the Short Route

HANNIBAL & ST. JOSEPH R. R. LINE.

Three Express Trains from Quincy or Macon to St. Joseph.

—ALSO DIRECT—

To Kansas City

☞ WITHOUT CHANGE OF CARS! ☜

CONNECTIONS ARE CLOSE AND DIRECT FOR

ATCHISON, WESTON & LEAVENWORTH.

CONNECTIONS:

AT KANSAS CITY, with Kansas Pacific Railway, for Lawrence, Ottawa, Topeka, Fort Riley Junction City, Fort Hays, Sheridan, &c.
AT KANSAS CITY, with Kansas City, Fort Scott, and Galveston Railroad, for Fort Scott, Fort Gibson, Galveston, &c.
AT ST. JOSEPH, with St. Joseph & Council Bluffs Railroad, ALL RAIL from St. Joseph to

Nebraska City, Council Bluffs & Omaha.

AT OMAHA, with Nebraska Union Pacific Railroad, for Fort Kearney, Julesburg, Cheyenne, Laramie, Benton, &c.
AT COUNCIL BLUFFS, for Sioux City, all Rail.

☞ By this Line, passengers have choice of Overland Routes, either via Smoky Hill or Platte Route To Denver, Central City, Salt Lake, Sacramento, California and all points in the Mining Regions.

Daily Overland Coaches via Smoky Hill Route leave Sheridan, end of U. P. R. R., for Santa Fe and New Mexico.

Through Tickets for Sale at all Ticket Offices.

P. B. GROAT, Gen. Ticket Agent. GEO. H. NETTLETON, Gen. Supt.
HENRY STARRING, Gen. Agent, Chicago.

Old, Reliable, Air-Line Route!

CHICAGO, ALTON & ST. LOUIS R. R.

SHORTEST, QUICKEST AND ONLY DIRECT ROAD TO

Bloomington, Springfield, Jacksonville, Alton,

— AND —

ST. LOUIS!

WITHOUT CHANGE OF CARS.

THE ONLY ROAD MAKING IMMEDIATE CONNECTIONS AT ST. LOUIS, WITH MORNING AND EVENING TRAINS

—FOR—

ATCHISON, LEAVENWORTH, KANSAS CITY,

Lawrence, Topeka, Memphis, New Orleans,

And All Points South and Southwest.

☞ TRAINS leave CHICAGO from the West-side Union Depot, near Madison Street Bridge. ☜

EXPRESS MAIL, [Except Sundays]	10:00 A. M.
LIGHTNING EXPRESS, [Except Saturdays and Sundays]	11:00 P. M.
NIGHT EXPRESS, [Except Saturdays]	7:05 P. M.
JOLIET ACCOMMODATION, [Except Sundays]	4:00 P. M.
JACKSONVILLE EXPRESS, [Daily]	7:10 P. M.

Trains arrive at Chicago at **8.10** P. M., **7.10** A. M. and **12:45** P. M. Joliet Accom., **9.45** A. M.

This is the ONLY LINE Between CHICAGO & ST. LOUIS RUNNING

Pullman's Palace Sleeping and Celebrated Dining Cars!

BAGGAGE CHECKED THROUGH.

Through Tickets can be had at the Company's office, No. 55 Dearborn street, Chicago, or at the Depot, corner of West Madison and Canal streets, and at all principal Ticket Offices in the United States and Canada. Rates of Fare and Freights as low as by any other Route.

A. NEWMAN, Gen. Pass. Agent. **J. C. McMULLIN, Gen. Supt.**

North Missouri R. R.

PASSENGERS FOR

KANSAS AND THE WEST,

ARE REMINDED THAT

THE NORTH MISSOURI R. R.

— IS —

11 MILES SHORTER than any other Route!

BETWEEN

St. Louis and Kansas City.

15 Miles Shorter between ST. LOUIS and LEAVENWORTH

— AND —

49 MILES SHORTER TO ST. JOSEPH!

THAN ANY OTHER LINE OUT OF ST. LOUIS.

☞ **Three Through Express Trains Daily!** ☜

Pullman's Celebrated Palace Sleeping Cars on all Night Trains!

☞ **FOR TICKETS,** apply at all Railroad Ticket Offices, and see that you get your Tickets via St. Louis and North Missouri Railroad.

C. N. PRATT, Gen. East'n Agt., 111 Dearborn st. CHICAGO.
J. M. DAVIES, General Passenger Agent, ST. LOUIS.
S. H. KNIGHT, General Superintendent, ST. LOUIS.

Pacific Railroad of Missouri.

THE MOST DIRECT AND RELIABLE ROUTE FROM ST. LOUIS THROUGH TO

KANSAS CITY, LEAVENWORTH & ATCHISON,

☞ WITHOUT CHANGE OF CARS! ☜

Close Connections at KANSAS CITY with Missouri Valley, Missouri River, Ft. Scott & Gulf, and Kansas Pacific R'ys, for Weston, St. Joseph, Junction City, Fort Scott, Lawrence, Topeka, Sheridan, Denver, Fort Union, Santa Fe, and

ALL POINTS WEST!

☞ At SEDALIA, WARRENSBURG and PLEASANT HILL, with Stage Lines for Warsaw, Quincy, Bolivar, Springfield, Clinton, Osceola, Lamar, Carthage, Granby, Neosho, Baxter Springs, Fort Gibson, Fort Smith, Van Buren, Fayetteville, Bentonville.

PALACE SLEEPING CARS on all NIGHT TRAINS.

Baggage Checked Through Free!

THROUGH TICKETS for sale at all the Principal Railroad Offices in the United States and Canadas. **Be Sure and Get your Tickets over the PACIFIC R. R. OF MISSOURI.**

W. B. HALE, Gen. Pass. and Ticket Agt.
THOS. McKISSOCK, General Superintendent.

Sixty-One Miles the Shortest Line! Only Thirty Hours!

— FROM —

CHICAGO TO NEW YORK.

Pittsburgh, Ft. Wayne & Chicago and Pennsylvania Central

IS THE ONLY ROUTE RUNNING ITS ENTIRE TRAIN THROUGH TO PHILADELPHIA AND NEW YORK, AND THE ONLY ROUTE RUNNING

THREE DAILY LINES OF PULLMAN'S DAY AND SLEEPING PALACES,

— FROM CHICAGO TO —

PITTSBURGH, HARRISBURG, PHILADELPHIA & NEW YORK,

☞ WITHOUT CHANGE! ☜

WITH BUT ONE CHANGE TO

BALTIMORE, PROVIDENCE, NEW HAVEN,

HARTFORD, SPRINGFIELD, WORCESTER AND BOSTON!

And the Most Direct Route to Washington City.

☞ Trains Leave WEST SIDE UNION DEPOT, corner West Madison and Canal Streets, as follows:

LEAVE:	Mail	Fast Express.	Pacific Exp.	Night Exp.	Valparaiso Accommodation (Leaves CHICAGO daily, (except Sunday,) at 4:50 P. M.	
CHICAGO	6.40 A. M.	11.00 A. M.	5.15 P. M.	9.00 P. M.		
PLYMOUTH	10.46 "	2.09 P. M.	s. 9.10 "	2.18 A. M.		
FORT WAYNE	2.00 P. M.	3.55 "	11.30 "	s. 5.30 "		
LIMA	4.24 "	5.30 "	1.25 A. M.	8.10 "		
FOREST	5.40 "	6.28 "	2.48 "	9.40 "		
CRESTLINE	6.00 A. M.	s. 8.00 "	4.30 "	D 12.05 P. M.		
MANSFIELD	6.42 "	8.25 "	5.00 "	12.34 "		
ORRVILLE	9.05 "	10.00 "	6.45 "	2.27 "		
ALLIANCE	11.15 "	11.20 "	s. 8.40 "	3.55 "		
ROCHESTER	D. 2.05 P. M.	1.15 A. M.	10.52 "	6.02 "		South'n Exp.
PITTSBURGH	4.00 "	2.50 "	12.45 P. M.	s. 7.30 "		5.30 A. M.
BLAIRSVILLE BRANCH	6.05 "	4.34 "	2.49 "	9.54 "		7.23 "
JOHNSTOWN	6.56 "	5.18 "	3.37 "	10.42 "		8.06 "
CRESSON	7.58 "	6.04 "	4.38 "	11.43 "		9.04 "
ALTOONA	s. 9.05 "	s. 7.00 "	s. 5.45 "	12.35 A. M.		s. 10.05 "
HUNTINGDON	10.21 "	8.06 "	7.04 "	1.45 "		11.14 "
LEWISTOWN	11.44 "	9.10 "	8.23 "	2.59 "		12.35 P. M.
HARRISBURG	2.10 A. M.	11.12 "	10.45 "	5.20 "		D. 2.50 "
LANCASTER	3.40 "	12.27 P. M.	12.15 A. M.	7.00 "		4.10 "
DOWNINGTON	5.00 "	1.37 "	1.40 "	s. 8.16 "		5.35 "
ARRIVE:						
PHILADELPHIA	6.30 "	2.45 "	3.10 "	9.40 "		7.00 "
NEW YORK, VIA PHILADELPHIA	10.41 "	6.00 "	6.43 "	1.00 P. M.		10.36 "
NEW YORK, VIA ALLENTOWN	.....	6.00 "	.....	12.05 P. M.		.....
BALTIMORE	.....	2.45 "	4.20 "	9.00 A. M.		7.00 "
WASHINGTON	.....	6.20 "	5.50 "	1.00 P. M.		10.00 "
BOSTON	9.00 P. M.	5.50 A. M.	5.05 P. M.	11.50 "		.....

THE FAST EXPRESS Leaves Chicago daily, except Sunday; the entire Train,—Baggage, Day and Palace Cars—RUNNING THROUGH from Chicago to New York, via Manua Junction; leaves Pittsburgh daily, except Sunday; has SLEEPING CAR from Crestline to Altoona, except Saturday. This train **reaches NEW YORK one hour in advance of all other Lines, and in time to make close connection for BOSTON!** No other Route through New York makes it! Arrives in BALTIMORE **Five Hours,** and WASHINGTON **Four Hours in Advance of Rival Routes!**

THE PACIFIC EXPRESS Leaves Chicago and Pittsburgh daily, for Philadelphia and New York, with PULLMAN PALACE CARS from Chicago; leaves Harrisburg for Baltimore daily, except Sunday; has SLEEPING CARS from Chicago to Pittsburgh, and from Altoona to Philadelphia. This train arrives in BALTIMORE **Nine Hours,** and WASHINGTON **Seven Hours, in advance of all other Lines!**

THE NIGHT EXPRESS Leaves Chicago daily, except Saturday and Sunday; leaves Pittsburgh daily, except Sunday; leaves Harrisburg for Baltimore daily; has SILVER PALACE CARS on Tuesday, Wednesday and Friday; COMPARTMENT CAR on Monday and Thursday from Chicago to Philadelphia and New York; has SLEEPING CARS from Chicago to Crestline, and from Pittsburgh to New York, Philadelphia and Baltimore. This train reaches BALTIMORE **Three Hours in Advance of competing Routes!**

THE MAIL Leaves Chicago daily, except Sunday, stopping at all Stations, and reaching Crestline the same evening [where passengers can transfer to Day Express]; leaves Crestline [Express,] the next morning, and leaves Pittsburgh daily, except Sunday. SLEEPING CARS from Pittsburgh to Philadelphia

THE SOUTHERN EXPRESS Leaves PITTSBURGH daily, except Monday, with SILVER PALACE CARS to Philadelphia and New York; leaves Harrisburg for Baltimore daily, except Sunday.

BOSTON AND NEW ENGLAND PASSENGERS will find this Route especially Desirable, as it Gives them an opportunity of Seeing the FINEST VIEWS AMONG THE ALLEGHANY MOUNTAINS,

Besides Visiting PITTSBURGH, PHILADELPHIA and NEW YORK, without extra cost!

All New England Passengers holding Through Tickets, will be Transferred, with their Baggage, to Rail and Boat Connections in NEW YORK, WITHOUT CHARGE.

Close Connections Made at Lima for all Points on the Dayton & Mich. and Cin., Hamilton & Dayton R'ys,

And at CRESTLINE, for CLEVELAND, ERIE, DUNKIRK, BUFFALO, NIAGARA FALLS, and all Points reached via Lake Shore R. R.

THROUGH TICKETS FOR SALE AT THE COMPANY'S OFFICES, N.W. COR. RANDOLPH & LA SALLE ST.,

65 and 52 Clark St., Cor. Randolph and Wells St., (under the Briggs House,) and at Depot, Chicago; also at Principal Ticket Offices in the West.

F. R. MYERS, Gen. Pass. and Ticket Agt, P. & F. W. R'y, Chicago. W. C. CLELAND, Gen. Western Pass. Agt, P. Ft. W. & C. R'y, Chicago.

T. L. KIMBALL, Gen. Western Pass. Agent, Penn. Central R. R., Chicago.

WHAT IS SAID OF THE RAILROAD GAZETTE.

"A very neat publication in point of appearance, and, as it always has been, is now a reliable, interesting and accurate journal, ably edited in its various departments. * * Our scissors have wandered over its columns "many a time and oft," and always with gratifying results."—*Buffalo Commercial Advertiser.*

"The news is very full, the discussions are conducted in good temper and with excellent information. To judge from this first number, the conductors of the GAZETTE know what "railroading" is, and what a proper weekly journal should be."—*New York World.*

"One of our most valuable exchanges. * * * Its columns teem with reliable information of great benefit to railroad men of every section of the United States."—*Leavenworth Bulletin.*

"Full of information, scientific and general, with regard to railroads all over the country, their construction, operation, etc."—*Rochester Chronicle.*

"For railroad men and others wishing to keep themselves thoroughly posted on railroad matters we know of no better paper."—*Madison State Journal.*

"A most valuable thing to the engineer and all railway men, the capitalist, traveler, mechanic and general reader."—*Brooklyn (N. Y.) Argus.*

"As it devotes much attention to Southern railroad and industrial interests, it is always interesting to Southern readers."—*Galveston News.*

"Has always been one of the best papers of the country for railroad intelligence."—*New York Commercial and Financial Chronicle.*

"In every respect a worthy representative of the energetic and go ahead city where it is published."—*Cincinnati Railroad Record.*

"Of great interest to railroad men, and almost equally so to those who use railroads."—*Marshall (Mich.) Statesman.*

"Makes a very handsome appearance and is full of valuable matter."—*Chicago Evening Post.*

"Every man who is at all interested in railroads would do well to take the GAZETTE."—*Jacksonville (Ill.) Independent.*

"It appears to be in many features the best journal of its class now extant."—*New York Official Railway News.*

"An impartial and independent journal, valuable to every railroad man."—*Parkersburg (W. Va.) Times.*

"It must prove a very valuable paper to stockholders and those who are interested in railroads."—*New York Globe.*

"Unquestionably the best railroad journal in the United States.—*Waukegan (Ill.) Patriot.*

"The best informed railway newspaper published in the West."—*Aurora (Ill.) Beacon.*

"A well-edited paper, showing industry and intelligence."—*American Railway Times.*

"Well worthy the patronage of all intelligent railroad men."—*Kalamazoo Gazette*

"Replete with matters connected with railroading."—*Holmesburg (Pa.) Gazette.*

"We regard it as the best railroad paper out."—*Peoria National Democrat.*

"Equal in appearance to any technical journal of America."—*Atchison Patriot.*

"Every railroad man reads the GAZETTE."—*Bloomington (Ill.) Leader.*

"A complete repository of railroad news."—*Harrisburg (Pa.) Patriot.*

"The best journal of its class in the United States."—*LaCrosse Leader.*

"Promising much for the future."—*Detroit Commercial Advertiser.*

"A model of what a railroad newspaper should be."—*Chicago Tribune.*

"An excellent journal for railroad men."—*Mankato (Minn.) Record.*

"Of great interest to railroad men."—*Delaware (O.) Gazette.*

Broad Gauge! Double Track!

ERIE RAILWAY.

4 EXPRESS TRAINS DAILY!

From Cleveland, Dunkirk and Buffalo, 625 Miles, to New York, WITHOUT CHANGE of Coaches!

☞ The Trains of this Railway are run in DIRECT CONNECTION WITH ALL WESTERN AND SOUTHERN LINES, for

Elmira, Williamsport, Oswego, Great Bend, Scranton, Newburgh,

NEW YORK, ALBANY, BOSTON, PROVIDENCE,

AND PRINCIPAL NEW ENGLAND CITIES.

New and Improved DRAWING ROOM COACHES are attached to the DAY EXPRESS Running THROUGH TO NEW YORK.

☞ **SLEEPING COACHES,** Combining all Modern Improvements, with perfect Ventilation and the peculiar arrangements for the comfort of Passengers incident to the **BROAD GAUGE,** accompany all night trains to New York.

CONNECTIONS CERTAIN! as Trains on this Railway will, when necessary, **wait from one to two hours for Western trains.**

All Trains of Saturday run directly Through to New York.

☞ **Ask for Tickets via Erie Railway,** which can be procured at **66 Clark Street,** Chicago, and at all Principal Ticket offices in the West and Southwest.

L. D. RUCKER, Gen'l Superintendent, New York. | **A. J. DAY,** Western Passenger Agent, Chicago. | **WM. R. BARR,** Gen'l Passenger Agent, New York

LAKE SHORE
— AND —
MICHIGAN SOUTHERN R.W.

THE GREAT THROUGH LINE BETWEEN

CHICAGO, BUFFALO & NEW YORK,

WITHOUT CHANGE!

AND THE ONLY RAILWAY

RUNNING PALACE COACHES THROUGH!

— BETWEEN —

CHICAGO & NEW YORK, via BUFFALO

☞ WITHOUT TRANSFER OF PASSENGERS! ☜

All Trains Stop at Twenty-Second Street to Take and Leave Passengers. Baggage Checked at that Station for all Points East.

4 EXPRESS TRAINS DAILY, [Sundays Excepted,] Leave Chicago from the New Depot, on Van Buren St., at the head of La Salle Street, as follows:

7:30 A. M. MAIL TRAIN.
VIA OLD ROAD. SUNDAYS EXCEPTED.

Leaves 22d Street 7:45 A. M. Stops at all Stations. **Arrives**—Toledo, 6:20 P. M.

11:00 A. M. SPECIAL NEW YORK EXPRESS,
VIA AIR LINE. SUNDAYS EXCEPTED

Leaves—Twenty-Second Street, **11:15 A. M. Arrives**—Elkhart, 2:55 P. M.; Cleveland 10:30 P. M.; Buffalo, 4:10 A. M.; New York, 6:55 P. M.; Boston, 11:45 P. M.

This Train has PALACE SLEEPING COACH Attached, Running

THROUGH TO ROCHESTER, WITHOUT CHANGE!

IN DIRECT CONNECTION WITH

Wagner's Celebrated Drawing-Room Coaches on N. Y. Central R. R.

5:15 P. M. ATLANTIC EXPRESS (Daily),
VIA AIR LINE.

Leave—Twenty-Second Street **5:30 P. M. Arrives**—Laporte, 8:10 P. M. (Stops 20 minutes for Supper); arrives at Toledo, 2:50 A. M.; Cleveland, 7:25 A. M. (20 minutes for Breakfast); arrives at Buffalo, 1:55 P. M.; Rochester, 5:10 P. M. (20 minutes for Supper); connects with **Sleeping Coach running Through from Rochester to Boston Without Change,** making but **One Change between Chicago and Boston.**

NEW AND ELEGANT SLEEPING COACH Attached to this Train, Running THROUGH from CHICAGO TO NEW YORK WITHOUT CHANGE! Arrives at NEW YORK, 7:00 A. M.

9:00 P. M. NIGHT EXPRESS
VIA AIR LINE. (DAILY EXCEPT SAT. & SUN.)

Leaves—Twenty-Second Street, **9:15 P. M. Arrives**—Toledo, 6:35 A. M. (20 minutes for Breakfast); arrives at Cleveland, 10:35 A. M.; Buffalo, 5:30 P. M.; New York, 11:00 A. M.; Boston, 3:50 P. M.

KALAMAZOO DIVISION.

Leave Chicago 7:30 A. M. Arrive at Kalamazoo 3:15 P. M.; Grand Rapids, 8:15 P. M.

Leave Chicago 9:00 P. M. Arrive at Kalamazoo 4:40 A. M.; Grand Rapids, 10:00 A. M.

☞ There being no heavy grades to overcome, or mountains to cross, the road bed and track being the smoothest and most perfect of any railway in the United States, this Company run their trains at a high rate of speed with perfect safety.

☞ Travelers who wish to SAVE TIME and make SURE CONNECTIONS, purchase Tickets via

LAKE SHORE & MICHIGAN SOUTHERN R'Y.

THE ONLY LINE RUNNING THROUGH BETWEEN CHICAGO AND BUFFALO, WITHOUT TRANSFER, and in Direct Connection with NEW YORK CENTRAL RAILROAD and ERIE RAILWAY.

General Ticket Office for Chicago, No. 56 Clark Street.

CHAS. F. HATCH,
General Superintendent, CLEVELAND, OHIO.

F. E. MORSE,
General Western Passenger Agent, CHICAGO.

ILLINOIS CENTRAL RAILROAD.

PASSENGER TRAINS LEAVE CHICAGO FROM THE GREAT CENTRAL DEPOT, FOOT OF LAKE ST

ST. LOUIS AND CHICAGO THROUGH LINE.

8:30 A. M. DAY EXPRESS, Sundays Excepted.
Arriving in ST. LOUIS at 9:30 P. M.

☞ This Train Reaches St. Louis ONE HOUR & FIFTEEN MINUTES in Advance of any other Route! ☜

9:30 P. M. FAST LINE. Saturdays Excepted.
Arriving at ST. LOUIS at 10:30 A. M.

AT ST. LOUIS, Direct Connections are Made FOR

Jefferson City, Sedalia, Pleasant Hill, Macon, Kansas City,

LEAVENWORTH, ST. JOSEPH & ATCHISON,

—Connecting at KANSAS CITY for—

LAWRENCE, TOPEKA, JUNCTION CITY, SALINA, SHERIDAN, &c.

CAIRO, MEMPHIS AND NEW ORLEANS LINE.

8:30 A. M. CAIRO MAIL, Sundays Excepted.
Arriving at **Cairo** 2:20 A. M., **Memphis** 12:40 P. M., **Mobile** 9:40 A. M., **Vicksburg** 9:30 A. M., **New Orleans** 11:10 A. M.

9:30 P. M. CAIRO EXPRESS, Except Saturdays.
Arriving at **Cairo** 3:15 P. M., **Memphis** 2:30 A. M., **Vicksburg** 5:00 P. M., **New Orleans** 1:30 A. M.

4:50 P. M. CHAMPAIGN PASSENGER,
Arriving at **Champaign** at 11:00 P. M.

☞ **THIS IS THE ONLY DIRECT ROUTE TO**

Humboldt, Corinth, Grand Junction, Little Rock, Selma, Canton, Grenada, Columbus, Meridian, Enterprise,

MEMPHIS, VICKSBURG, NEW ORLEANS & MOBILE.

At NEW ORLEANS, connections are made for

GALVESTON, INDIANOLA,

And all Parts of Texas.

☞ **NOTICE.—This Route is from 100 to 150 MILES SHORTER, and from 12 to 24 HOURS QUICKER than any other.**

THIS IS ALSO THE ONLY DIRECT ROUTE TO

DECATUR, TERRE HAUTE, VINCENNES & EVANSVILLE.

Peoria and Keokuk Line.

8:30 A. M. KEOKUK PASSENGER, Sun. Excepted.
Arriving at **Chenoa** 3:15 P. M., **El Paso** 4:05 P. M., **Peoria** 5:40 P. M., **Canton** 7:14 P. M., **Bushnell** 8:39 P. M., **Keokuk** 11:26 P. M., **Warsaw** 12:05 A. M.

9:30 P. M. KEOKUK PASSENGER, On Saturdays,
This Train will leave at 4:50 P. M. Arriving at **Chenoa** 3:35 A. M., **El Paso** 4:25 A. M., **Peoria** 6:05 A. M., **Canton** 7:36 A. M., **Bushnell** 9:35 A. M., **Keokuk** 12:05 P. M., **Warsaw** 12:40 P. M.

THIS IS THE DIRECT ROUTE TO

PEORIA, CANTON, KEOKUK, CHATSWORTH, FAIRBURY,

CHENOA, EL PASO, BUSHNELL, HAMILTON, & WARSAW.

Connecting at PEORIA for

PEKIN, HAVANA, BATH AND VIRGINIA.

—CONNECTING AT KEOKUK FOR—

Ottumwa, Eddyville, Oskaloosa, Pella, Monroe, Des Moines.

Elegant Drawing Room Sleeping Cars

ATTACHED TO ALL NIGHT TRAINS.

☞ **SPACIOUS AND FINE SALOON CARS, with all Modern Improvements, Run upon all Trains.**

BAGGAGE CHECKED THROUGH TO ALL IMPORTANT POINTS.

☞ For Through Tickets, Sleeping Car Berths, Baggage Checks, and information, apply at the office of the Company in the Great Central Depot, foot of Lake St.

Hyde Park and Oakwoods Train.

	LEAVE.	ARRIVE.		LEAVE.	ARRIVE.
HYDE PARK TRAIN,...	*6:20 A. M.	*7.45 A. M.	HYDE PARK TRAIN,....	*3:00 P. M.	*3:15 P. M.
HYDE PARK TRAIN...	8:05 A. M.	9.13 A. M.	HYDE PARK TRAIN,....	*6:10 P. M.	*7:35 P. M.
HYDE PARK TRAIN,..	*12:10 P. M.	*1:40 P. M.			

* Sundays Excepted.

W. P. JOHNSON, Gen. Pass. Agent. **M. HUGHITT, Gen. Supt.**

1870. Great Central Route! 1870.

SPEED! COMFORT! SAFETY!

MICHIGAN CENTRAL and GREAT WESTERN RAILWAYS!

The Great Central Route, via Niagara Falls, to

NEW YORK AND NEW ENGLAND.

Pullman's Magnificent Palace Drawing-Room Cars,

— FROM —

CHICAGO TO NEW YORK CITY, WITHOUT CHANGE.

4 PASSENGER TRAINS LEAVE CHICAGO, DAILY EXCEPT SUNDAY.
(DEPOT, FOOT OF LAKE STREET,) as Follows:

5:00 A. M. (SUNDAYS EXCEPTED.) MAIL TRAIN. Stops at all Stations. Arrives DETROIT at 5:50 P. M.

11:00 A. M. (SUNDAYS EXCEPTED.) SPECIAL NEW YORK & BOSTON EXP. Arrives at Michigan City 1:12 P.M.; New Buffalo 1:33, Niles 2:13, [Dinner], Kalamazoo 3:44 P. M.; Battle Creek 4:24, Marshall 4:43, Jackson 5:40, Detroit 7:35, London 11:15, Hamilton 2:00 A. M.; Toronto 9 20, Suspension Bridge 3:40, Rochester 6:50 A. M.; Albany, 2:40 P. M.; NEW YORK, 7:00, BOSTON, 11:50 P. M. ☞ This train connects at ROCHESTER (7:00 A. M.) with

Wagner's Magnificent Palace Drawing-Room Cars!

☞ RUNNING THROUGH TO NEW YORK, WITHOUT CHANGE! ☜

5:15 P. M. (DAILY.) ATLANTIC EXPRESS. Arrives at Michigan City, 7:18 P. M.; Niles 8:30 P. M. [Supper]; Kalamazoo, 10:25 P. M.; Jackson, 1:00 A. M.; Detroit 3:40, London, 8:35, [Breakfast]; Hamilton 11:50, Suspension Bridge 1:30 P. M.; Rochester 5:10 P. M.; Albany, 1:50 A. M.; NEW YORK, 7:00 A. M.; BOSTON, 11:00 A. M. A MAGNIFICENT DRAWING-ROOM SLEEPING CAR is attached to this train daily, FROM CHICAGO TO NEW YORK CITY. The celebrated

☞ Hotel Drawing-Room Car is also attached to this Train from Chicago to Rochester! ☜

☞ These, together with **ELEGANT DAY CARS TO SUSPENSION BRIDGE,** make this Train the favorite Train for all points East.

SPECIAL NOTICE.—Boston and New England Passengers will please notice that this Train now makes direct connection through. A SLEEPING CAR is attached at Rochester at 5.30 P. M., running through to Springfield, Mass., thus avoiding transfer at Albany. Breakfast at Springfield. This Train reaches Springfield early enough second morning to **Connect with all Trains** up and down the Connecticut.

9:00 P. M. (SAT. & SUN. EXCEPTED). NIGHT EXPRESS. Arrives at Michigan City, 11:03 P. M.; Niles, 12:25 A. M.; Kalamazoo, 2:00; Marshall, 3:12; Jackson, 4:25; Grand Trunk Junction, 7:00; Detroit, 7:30; London. 1:45 P. M.; Hamilton, 4:35; Toronto, 9:35; Niagara Falls, 6:15; Buffalo, 7:15 P. M.; Rochester, 9:10; Syracuse, 12:35 A. M.; Rome, 1:55; Utica, 2:25 Albany, 6:30 A. M.; NEW YORK, 10:00 A. M.; BOSTON, 3:40 P. M.

PULLMAN'S PALACE SLEEPING CARS ARE ATTACHED TO THIS TRAIN FROM CHICAGO TO DETROIT,
And from Suspension Bridge to New York.

WE INVITE THE ATTENTION OF THE TRAVELER to the SPLENDID EQUIPMENTS of this FIRST-CLASS LINE TO THE EAST!

☞ FOR THROUGH TICKETS, and any and all information, Sleeping Car accommodations, &c., apply at General Office in Tremont House Block, at office in Great Central Depot; also at No. 60 Clark street, under Sherman House; at Grand Trunk Railway Office, 48 Clark street, or at New York Central Railroad Office, No. 53 Clark street, and at office under Briggs House.

H. E. SARGENT, Gen. Supt. M. C. R. R. W. K. MUIR, Gen. Supt. Gt. Western R. W. HENRY C. WENTWORTH, Gen. Pass. Agt.

CHICAGO, INDIANAPOLIS & LOUISVILLE

THROUGH LINE!

—VIA—

VIA MICHIGAN CENTRAL RAILROAD.

THE ONLY ROUTE TO

TO LOUISVILLE, WITHOUT CHANGE OF CARS.

TWO EXPRESS TRAINS Leave Chicago Depot, Foot of Lake as Follows:

8:00 A. M. (EXCEPT SUNDAY.) MORNING EXPRESS. Arriving at LaFayette, 2:25 P. M.; Indianapolis, 6:00 P. M; Louisville, 11:30 P. M.

4:00 P. M. (EXCEPT SATURDAY) AFTERNOON EXPRESS. Arriving at Michigan City 6:20 P. M. [Supper]; LaFayette, 11:30 P. M. Indianapolis, 2:15 A. M.; Louisville, 7:00 A. M.; Nashville, 4 00 P. M.

A GOOD SLEEPING CAR is Attached to this Train Every Night,
And goes from Chicago to Louisville WITHOUT CHANGE!

☞ **SPECIAL NOTICE.**—This Train stops at Michigan City for Supper, and waits at that point for Michigan Central Atlantic Express East, leaving Chicago at 4:45 p. m. Passengers going South, and wishing as much time in Chicago as possible, can take the 4:45 p. m. Michigan Central Atlantic Express, and connect without fail at Michigan City, with above Through Louisville Express.

☞ **THE GREAT BRIDGE ACROSS THE OHIO** at Louisville being completed, passengers are relieved of the omnibus transfer.

FOR THROUGH TICKETS, via this line, apply at offices of connecting lines and at all ticket offices in Chicago.

HENRY C. WENTWORTH, Gen. Pass. Agent.

Michigan Central R. R.

LOCAL CONNECTIONS:

Chicago & Michigan Lake Shore Railroad.

Open from New Buffalo to St. Joseph, Mich.

8:00 A. M. AND **4:00** P. M. **Trains from Chicago Connect at New Buffalo.**

Kalamazoo, Allegan & Grand Rapids R. R.

Open to Grand Rapids.

8:00 A. M. AND **9:00** P. M. **Trains from Chicago Connect at Kalamazoo.**

Peninsular Railroad of Michigan.

Open to Charlotte.

8:00 A. M. AND **9:00** P. M. **Trains from Chicago Connect at Battle Creek.**

Jackson, Lansing & Saginaw Railroad.

Open to Bay City, Mich. Passing through Lansing and Saginaw.

8:00 A. M. AND **9:00** P. M. **Trains from Chicago Connect at Jackson.**

GRAND TRUNK RAILWAY.

All Michigan Central Trains Connect at Grand Trunk Junction

— FOR —

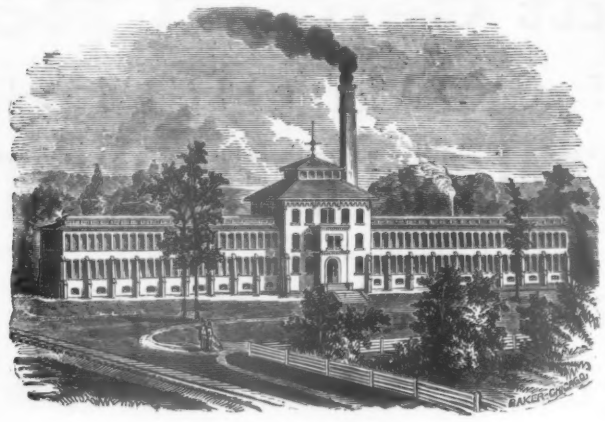
SARNIA, TORONTO, MONTREAL,

PORTLAND, BOSTON, BUFFALO, OGDENSBURG

AND ALL POINTS EAST.

H. E. SARGENT, General Superintendent.

Elgin Watches! Elgin Watches!



MANUFACTURED BY

THE NATIONAL WATCH COMP'Y.

OFFICE GEN'L SUP'T U. P. R. R. | OMAHA, Neb., Dec. 16, 1869.

HON. T. M. AVERY, President National Watch Co., Chicago, Ill.

Dear Sir—During the months that I have carried one of your B. W. Raymond Watches, it has not failed to keep the time with so much accuracy as to leave nothing to desire in this regard.

For accuracy in time keeping, beauty of movement and finish your watches challenge my admiration and arouse my pride as an American, and I am confident that in all respects they will compete successfully in the markets of the world with similar manufactures of older nations. They need only to be known to be appreciated.

Yours, most respectfully,
C. G. HAMMOND, Gen. Supt.

OFFICE OF GEN'L SUP'T H. R. R. R. | NEW YORK, Jan. 17, 1870.

M. AVERY, ESQ., President National Watch Co.,

Dear Sir—The Watch made by your Company, which I have carried the past two months, has kept excellent time. I have carried it frequently on engines, and have been on the road with it almost daily. During this time it has run uniformly with our standard clock. Truly yours,
J. M. TOUCEY

PENN'A R. R. CO., GEN. SUP'T. OFFICE, | ALTOONA, Jan. 19, 1870.

T. M. AVERY, ESQ., President National Watch Co., Chicago:

Dear Sir—This Company has purchased and put in the hands of its engine-men, eighty "Raymond movements," which have given excellent satisfaction and proved to be very reliable time-keepers. In addition to these, quite a number of Elgin Watches have been purchased by officers and employes of this Company, all of whom have been well pleased with the efficiency and regularity of the movements manufactured by the National Watch Company. Respectfully,
EDWARD H. WILLIAMS,
General Superintendent.

AMERICAN MERCHANTS' UNION EXPRESS CO | CHICAGO, Feb. 17, 1870.

T. M. AVERY, ESQ., President National Watch Co., Chicago, Ill.:

Dear Sir—It gives me pleasure to state that the two or three Elgin Watches I have at different times purchased for presentation have given entire satisfaction, and are highly valued as elegant and correct time-keepers.

A very large number of your Watches are being carried by the Messengers in the employ of this Company, and are giving entire satisfaction, their time-keeping qualities being implicitly relied upon.
CHAS. FARGO.

MICHIGAN CENTRAL R. R CO | CHICAGO, Jan. 15, 1870.

T. M. AVERY, ESQ., President National Watch Co.:

Dear Sir—I have now been carrying one of your Elgin Watches, of the B. W. Raymond pattern, for nearly five months, and it affords me much pleasure to testify in favor of its time-keeping qualities, in which, after this length of time, I have great confidence. It has from the first run very close to the standard time, the slight variation being uniform, and susceptible of correction by careful regulation. My experience thus far justifies the opinion that it is a *very safe and reliable* time-keeper.
Respectfully yours, H. E. SARGENT.

OFFICE OF THE GEN. SUP'T. C. & N. W. R'Y, | CHICAGO, Feb. 16, 1870.

T. M. AVERY, ESQ., President National Watch Co.:

Dear Sir—I have pleasure in expressing my opinion of the Elgin Watches, the more so since I do not think there is a better watch made. A large number of them are in use by our conductors and enginemen, and other employes, and I have heard no dissenting opinion upon their merits. They run with a smoothness and uniformity fully equal to any other watch I know of, and justify all your claims of excellence in manufacture and fitting of parts. Yours, truly,
GEO. L. DUNLAP, Gen'l Sup't.

LAKE SHORE & MICHIGAN SOUTHERN R. R. | CHICAGO, Jan. 27, 1870.

T. M. AVERY, ESQ., President National Watch Co.:

Dear Sir—I have carried the Elgin Watch long enough to be able to pronounce it a first-rate time-keeper. I am making a very careful test of its performance and will soon give you the results. I think it will show that the West can produce Watches equal to to the manufacture of any part of the world. Yours, truly,
E. B. PHILLIPS,
President L. S. & M. S. R. R. Co.

OFFICE GEN. SUP'T ERIE RAILWAY, | NEW YORK, Feb. 7, 1870.

T. M. AVERY, ESQ., President National Watch Co., Chicago, Ill.:

Dear Sir—Having for about three months tested, in various ways, the "time-keeping" qualities of one of your Elgin Watches, I most cheerfully award it the praise that it is due. For one month the Watch was carried by one of our Locomotive Engineers, and since by different persons, so that its full value as a time-keeper could be known under different modes of treatment. I will simply say that it has given *perfect* satisfaction, and in my opinion is as near perfection as I believe it possible a Watch can be made.
Respectfully yours, L. H. RUCKER,
General Superintendent.

☞ No Movements Retailed by the Company. | Business Office and Salesroom of the National Watch Company, Nos. 159 and 161 Lake Street, Chicago.

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